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ABSTRACT

The National Assessment of Vocational Education (NAVE) evaluated and described the vocational education services delivered to special populations under the Carl D. Perkins Vocational Education Act, the effects of the act in modernizing the vocational education system, the impact of vocational education on academic skills and employment opportunities, and other topics. Some of the findings and recommendations of the NAVE are the following: (1) the Perkins Act is a weak mechanism for achieving its goals because little additional direction has been provided on federal or state levels on the targeting of federal funds for supplementary services to disadvantaged and handicapped students, nor has technical assistance been provided on effective practices for serving these populations; (2) secondary education greatly needs improvement, and six major objectives for federal policy in vocational education are proposed; (3) although postsecondary education is a growing enterprise, its major problem is that many students do not stay in it long enough to receive in-depth training, and federal policy changes should be made to improve rates of program completion, especially among targeted groups; and (4) the federal role in vocational education should be strengthened and changes should be made in the current legislation. (KC)

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FINAL REPORT
Volume I

SUMMARY OF FINDINGS AND RECOMMENDATIONS

NAVE

NATIONAL ASSESSMENT OF VOCATIONAL EDUCATION
UNITED STATES DEPARTMENT OF EDUCATION

SUMMARY OF FINDINGS AND RECOMMENDATIONS

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National Assessment of Vocational Education

July 1989

This document reflects the views of the National Assessment of Vocational Education. It does not necessarily represent the views of the U.S. Department of Education.

PREFACE

The National Assessment of Vocational Education (NAVE) was mandated by Congress in the Carl D. Perkins Act of 1984 (Section 403[a]). The mandate calls for "descriptions and evaluations" of the vocational education services delivered to special populations, the effects of the Act in modernizing the vocational education system, the impact of vocational education on academic skills and employment opportunities, and other topics.

The final report from the National Assessment consists of five volumes.

Volume I: *Summary of Findings and Recommendations* summarizes the main findings and conclusions of the National Assessment.

Volume II: *Implementation of the Perkins Act* examines how the federal law was implemented and federal funds were distributed and used under the Perkins legislation.

Volume III: *Secondary Vocational Education* analyzes high school vocational education enrollments, academic achievement and employment outcomes, and recommends federal policy.

Volume IV: *Postsecondary Vocational Education* analyzes postsecondary vocational education enrollments, employment outcomes, issues of finance in relation to federal support for vocational education, and recommends federal policy.

Volume V: *Handicapped and Disadvantaged Students--Access to Quality Vocational Education* describes and analyzes the participation of handicapped and disadvantaged students in vocational education.

These reports were based on a series of studies commissioned by the NAVE. Copies of the NAVE reports and a list of all the contractor reports can be obtained by contacting: NAVE-Room 3141, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC, 20202.

A distinguished panel of experts met four times to advise the National Assessment and review drafts of the interim and final reports. The members of the panel, who gave generously of their time and sound advice, were: Charles Benson (University of California at Berkeley), Sue E. Berryman (Teachers College, Columbia University), James Campbell (MISSCO Corporation), Edwin Herr (Pennsylvania State University), Dorothy Horrell (Red Rocks Community College), James Kadamus (State Department of Education, New York), Willis McCleod (Petersburg Public Schools), Milbrey McLaughlin (Stanford University), Daniel Morley (State Street Bank and Trust Company), William Morrill (Math Tech, Inc.), Lawrence Palmer (Cornell University), Robert Scot (North Carolina System of Community Colleges), and David Wise (Harvard University).

NAVE staff began to implement the National Assessment in January 1987, after the study plan was reviewed by congressional staff members in both the House and Senate education committees. The key staff members were Lana Muraskin, David Goodwin, Robert Meyer, and Dorothy Shuler. Specific acknowledgements of all staff and contractor contributions to the final reports are contained in each of the reports.

The National Assessment of Vocational Education was generously supported by the Office of Planning, Budget, and Evaluation of the Department of Education. Key officials of the Office and the Department granted NAVE staff both the funds required and the independence necessary to carry out the study. Special gratitude is owed in this regard to Alan S. Ginsburg of the Planning and Evaluation Service and Thomas M. Corwin of the Budget Service.

However, all conclusions and recommendations of this report are strictly those of the National Assessment and do not necessarily represent views of the Department of Education.

John G. Wirt
Director, National Assessment
of Vocational Education

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EXECUTIVE SUMMARY

The National Assessment of Vocational Education (NAVE) has studied the implementation of the Carl D. Perkins Act of 1984 and the status of vocational education at the secondary and postsecondary levels. We conclude that the basic goals of increasing the access of special populations to high-quality vocational education and improving the overall quality of programs are sound, but that the legislation is a weak instrument for achieving these goals. We recommend some fundamental changes in policy at the secondary and postsecondary education levels in order to better achieve the goals.

IMPLEMENTATION OF THE PERKINS ACT

The current legislation relies on six set-asides and a number of different targeting provisions and fiscal requirements to direct 57 percent of Basic Grant resources to students with special needs. These six groups are: disadvantaged students, handicapped students, adults, single parents and homemakers, persons in nontraditional training for their sex, and incarcerated individuals. The other 43 percent of the Basic Grant is directed to overall program improvement. The implementation studies conducted by NAVE provide detailed information on how the Perkins Act funds have been used by states and localities and served to accomplish the Act's goals. The data presented are generally for fiscal year 1986-87.

How Have States Allocated Perkins Act Funds?

Overall, about 40 percent of Perkins Act funds are spent at the postsecondary level, but the rates at which states allocated Perkins Act funds among secondary and postsecondary sectors varied greatly. Postsecondary allocations ranged from 8 to 100 percent. In addition, separate area vocational school districts appeared to receive a disproportionate share of the federal funds that flowed to secondary education. Area vocational school districts and postsecondary institutions received larger grants than regular school districts on a per-pupil basis.

At the secondary level, NAVE finds some evidence that Basic Grant funds are targeted to school districts with higher rates of poverty. But the amount of targeting has not increased as a result of the introduction of the intrastate formula or other provisions in the Perkins Act. There is no evidence of comparable targeting at the postsecondary level. There is no adequate way to measure targeting and poverty for area vocational school districts.

Most school districts received awards that were too small to mount new initiatives of any size. Half of all school districts received $7,910 or less, and three-quarters of the districts received $25,000 or less. Such resources are insufficient to pay for even one full-time teaching position. By contrast, separate area vocational school districts and postsecondary institutions received median grants exceeding $90,000.

How Have Local Recipients Targeted and Used Perkins Act Set-Aside Funds?

For the *disadvantaged set-aside* alone, NAVE found that school districts with the highest poverty rates had a greater likelihood of receiving an award, and their per-student disadvantaged (and handicapped) set-aside awards were larger than those in other districts. Within districts, however, case studies were unable to uncover any systematic means for funds distribution or service provision based on student or programmatic characteristics. Many districts did not know how many students were eligible for services, and some did not know how many were actually served. The only systematic distribution mechanism we uncovered through the case studies was a tendency to locate services in facilities other than comprehensive high schools--such as area vocational facilities, vocational high schools, and alternative schools.

Districts that received funds under the *disadvantaged set-aside* were more likely than those without funds to indicate that they provided vocational assessments to academically disadvantaged students. Student assessments may do little, however, to determine or upgrade the vocational programs in which secondary students enroll. Districts with set-aside funds were no more likely than districts without such funds to provide other additional services including academic remediation, summer jobs, alternative schools, and curriculum modification.

Services under the *handicapped set-aside* go to students with individualized education plans (IEPs) at the secondary level and to students with cognitive or physical impairments at the postsecondary level. Perkins Act resources under the handicapped set-aside are used primarily to help pay for the instructional costs of vocational education for students with handicaps (e.g., extra aides in classrooms) in both mainstreamed and separate settings, and to provide assessments and other forms of guidance. Instructional spending was divided between mainstreamed and separate classes at rates of about 1.5 to 1 in school districts and 2 to 1 in area vocational districts.

Sex equity grants are small and spread among a substantial number of activities. At the secondary level, common uses included in-service training, recruitment, and counseling. Area vocational schools had similar patterns but somewhat less support for in-service education and more for instructional salaries. Postsecondary institutions had spending patterns similar to those of area vocational schools. Case studies revealed a small amount for direct economic assistance at the postsecondary level. Most of the activities supported under the set-aside appear to be additional to those that districts and institutions would undertake on their own or would continue without federal support, particularly at the secondary level.

At the secondary level, most funds under the *single-parent and homemaker set-aside* have flowed to a small number of school districts and a larger number of area vocational districts. From the case studies it appears that most of these funds were used in programs for teenage parents, particularly for counseling. Only a subset of districts used funds for instructional services. School districts receiving funds had lower poverty rates than districts without funds. Median expenditures in school districts were small in comparison with those in area vocational districts.

At the postsecondary level, grants were about the same size as in area vocational school districts. From case studies we have learned that, in a number of the community college sites, the funds support a portion of the costs of centers for displaced homemakers. Services were similar across sites and included recruitment, counseling, courses or group sessions aimed at building assertiveness and self-esteem, referral to child care and other social services, referral for student aid, referral to training and, in a small number of sites, instructional services or direct financial support.

It appears that the *adult and corrections set-asides* pay for general operating support of educational offerings. Few states have established priorities for the funds. The set-aside for adults helps support vocational programs in school districts (including area vocational schools) and postsecondary institutions. In the case studies, community colleges were more likely to identify a specific use of adult set-aside funds, but overall, few specific purposes were identified.

How Have Local Recipients Used Program Improvement Funds?

Slightly over one half of *program improvement funds* traced to the local level were spent by postsecondary institutions. A little over a quarter of school districts and about half of area vocational school districts and postsecondary institutions spent funds. Median expenditures in separate area vocational districts were 2.5 times, and in postsecondary institutions 5.1 times, the size of those in school districts.

At both secondary and postsecondary levels, most program improvement funds were used to purchase equipment. Equipment purchases described in the case studies appeared to be about equally divided between computers (and related software and printers) and technical equipment for specific vocational programs. School districts were more likely to purchase computers, with area vocational schools and postsecondary institutions somewhat more likely to purchase technical equipment. In the few states that forbade the use of the funds for the equipment, funds were used for a wide range of activities including adoption of the Principles of Technology curriculum, support of student organizations, and in-service training. Few program improvement funds were spent for programs or services for special populations.

How Do States Use Federal Funds for Statewide Projects?

A small share of sex equity, adult, and single-parent set-aside funds and a substantial share of program improvement funds were retained for statewide activities. Most statewide projects involved assistance to secondary vocational education. In states where case studies were conducted, the amount of program improvement funds retained ranged from less than 10 to 40 percent.

In the nine states where case studies were conducted, funds retained at the state level were most commonly used for curriculum development. Other uses included establishing and maintaining regional resource centers for vocational education and staff development (in-service and pre-service education). A few states used federal resources to develop curricula and stimulate change aimed at teaching general vocational skills or at curriculum and model program development for vocational-academic integration. All states visited in the case studies belonged to interstate consortia supported with federal funds.

What Are NAVE's Major Conclusions About the Perkins Act?

We conclude that, in its current form, the Perkins Act is a weak mechanism for achieving its goals. One reason is that little has been done in the regulatory or implementation process to convert the goals and provisions of the legislation into effective guidelines for states and localities. Little additional direction has been forthcoming from federal or state levels on the targeting of federal funds for supplementary services to disadvantaged and handicapped students, nor has technical assistance been provided on effective practices for serving these populations.

More effective means of supporting both program improvement and the targeting of funds on poor students are needed. Federal resources under the set-asides and program improvement sections of the Act are frequently used for activities that local recipients are likely to have undertaken anyway or for noninstructional support services for individual students, rather than focusing on upgrading and improving programs. The reasons for these uses of funds include the small size of grants and the regulatory processes required to implement the supplementary services, excess costs, and matching provisions of the set-asides.

The lack of an effective nonsupplanting requirement and the small size of grants have turned the documentation of compliance with the set-asides into an accounting exercise in which federal funds are sometimes attributed to high-cost activities that would have been supported anyway.

There is some targeting of federal funds to districts with the highest poverty rates, but the intrastate formula introduced in the Perkins Act has not increased the resources flowing to those districts--in part because the definitions are loose (such as academically or economically disadvantaged student) and in part because the formula accounts for only a third of the Basic Grant funds.

The multiple set-asides in the Perkins Act have contributed to the fragmentation of federal resources at the state and local levels. State practices of creating separate priorities and competitions within the set-asides and imposing additional rules beyond federal criteria add to the fragmentation.

For these reasons, the excess cost and matching provisions, the intrastate formula, and the set-asides in the Perkins Act should be eliminated. We propose alternatives to these provisions in the following sections.

SECONDARY VOCATIONAL EDUCATION

Status of Secondary Vocational Education

Who Participates in Secondary Vocational Education?

A striking characteristic of secondary vocational education is that student participation is nearly universal. As expected, students who plan to complete their education at the end of high school (work-bound students) are the largest consumers of vocational education. Surprisingly, college-bound students also take substantial amounts of vocational education, and not just general, introductory, or consumer and homemaking courses, but occupationally specific vocational education as well. In 1982, students planning to attend postsecondary vocational institutions or college accounted for nearly three-quarters of all vocational credits taken by high school graduates. For 1982 graduates:

- Students planning to work after high school took an average of 6.06 credits of vocational education during high school. Students who aspired to attend a postsecondary vocational-technical institution averaged 5.81 credits; students planning to attend some college averaged 4.55 credits, and students who planned to graduate from college averaged 3.17 credits.

- Work-bound students were 18.2 percent of high school graduates and took 25.2 percent of all vocational credits. Students planning to attend postsecondary vocational-technical institutions or college (including two-year public colleges) were 82 percent of graduates and took 26.5 percent and 47.9 percent of all vocational credits, respectively.

- Total vocational enrollments (average: 4.21 credits) exceeded enrollments in all other subject areas, including English, the largest academic subject (average: 4.02 credits).

The breadth of participation in vocational education presents major challenges to educators. One challenge is adapting the vocational curriculum to provide a range of courses with the right mix of job-specific and transferable occupational skills to serve students with different educational and work goals. Much of the secondary vocational curriculum may need to be broadened for the many students who plan to obtain further education, or who have not committed themselves to an occupational field, by placing greater emphasis on transferable skills. On the other hand, too many general vocational courses could jeopardize its value for work-bound (and other) students seeking immediate skills needed to get good jobs. Arriving at a sound balance of offerings to meet the needs of students with different goals appears to require significant change in the vocational curriculum.

A second challenge invited by the large amount of vocational education taken by both work-bound students and students planning further education is to expand the contribution of vocational education to academic education.

These challenges are underscored by changes in the enrollment of students in academic and vocational subjects over the past 14 years. Two major trends stand out--a steady increase in total credits earned by high school graduates from 1975 to 1987, and a shift from growth in the amount of vocational education taken to growth in mathematics, science, and foreign language credits.

- The total credits (academic, vocational, and personal/other) taken by high school graduates increased steadily from 20.86 in the period 1975 to 1978 to 22.84 total credits in 1987, with the largest increase (1.23 credits) between the classes of 1982 and 1987.
- The average amount of vocational education taken by students generally increased up to 1982. Since then, average enrollments in vocational education have leveled off or declined slightly.
- Since the early 1980s, there has been a major increase in credits taken in academic subjects, with most of the increase occurring in mathematics, science, and foreign languages--and among students who received "mostly A's, B's, or C's."
- At the same time, the share of occupationally specific course work in the vocational curriculum has steadily increased from 57 percent of all credits in 1975 through 1978 to 65 percent in 1987, but the amounts of general vocational and consumer and homemaking education have declined.

What is the Access of Special Populations to High-Quality Secondary Vocational Education?

A major concern of federal policy has been the participation of special populations in vocational education, and particularly the quality of the programs in which they are enrolled. Transcript analyses performed by NAVE provide some new answers to questions about the participation of special populations in secondary vocational education. We find that academically disadvantaged students and students with handicaps clearly take more vocational education than do academically advantaged and nonhandicapped students. For students with handicaps, the vocational education they take is also likely to be "mainstreamed" (81.7 percent of credits), that is, the credits are earned in regular as opposed to self-contained classrooms. In contrast, only 59.6 percent of the academic credits of handicapped students as earned in regular classrooms.

Problems of participation in high-quality vocational education are serious for female handicapped and academically disadvantaged students. Approximately half of all the vocational credits earned by handicapped and disadvantaged females are in low-level service occupation courses or consumer and homemaking education. Otherwise, handicapped and disadvantaged students take the same proportion of occupationally specific vocational education as other students; the same or more credits, on average, in area vocational schools; and about the same amount of cooperative and other forms of work-based education. Work-based education has been found helpful to students in gaining employment after leaving school.

There are major differences in the quality of vocational education between schools with high and low concentrations of academically and economically disadvantaged students, as measured by the breadth and depth of courses offered. Students in schools with high concentrations of disadvantaged students take large amounts of vocational education and have the most limited range of vocational offerings from which to choose.

- Schools with the highest poverty rates and lowest academic achievement are 40 percent less likely to offer their students access to an area vocational facility than schools with the lowest poverty rates.
- Schools with the largest percentage of disadvantaged students offer 40 percent fewer vocational courses, a third as many occupational programs, and half as many advanced courses as schools with the smallest percentage of disadvantaged students.
- Students in schools with the highest rates of poverty and lowest achievement average 6.03 credits of vocational education and 12.06 credits of academic subjects, compared with an average of 3.26 credits of vocational education and 16.26 credits of academic subjects in the most advantaged schools.

These findings indicate the existence of "school effects" on the quality of vocational education that, in addition to individual-level effects, argue for targeting federal resources on the improvement of programs in schools with large numbers of poor and low achieving students.

Secondary Vocational Education and Job Specific Skills

One of the major issues confronting secondary vocational education is the extent to which it should emphasize job specific training as opposed to broad occupational training or even training that is of a very general (or transferable) nature. The case for job specific training depends in large part on the performance of secondary vocational education in placing students in training-related jobs. The National Assessment has conducted a thorough analysis of this issue.

Our analysis is based on a new performance indicator, the "skilled jobs course utilization rate," which measures the share of all specific occupational vocational courses employed in training-related jobs that require more than minimal skills. This indicator provides a more complete and accurate assessment of the labor market than other indicators, such as the training-related placement rate. The measure accounts for the skill levels of jobs held by students who have received training and excludes jobs requiring low levels of skill.

The findings reported below are based on graduates of the high school class of 1982 who did not enroll in postsecondary education. All estimates pertain to the fall of 1983, approximately 16 months after the students completed their schooling.

We estimate that, for women who get no education beyond high school, about 46 percent of all occupationally specific vocational courses were used in training-related skilled jobs. The comparable number for men was 33 percent. Although it would be unrealistic (and even undesirable) to expect rates of course utilization to approach 100 percent, these rates are low enough to call into question the efficacy of highly job specific forms of occupational training for many students at the secondary level. It may be possible to restructure secondary vocational education, however, so that it serves students with different work and educational goals more effectively.

Several factors account for the under-utilization of occupationally specific vocational training. Two of the most important ones are "voluntary nonplacements" and "frictional nonplacements." The former occurs when students choose to work in occupations unrelated to their vocational training. The latter occurs when students accept work in nontraining-related occupations because they are unable to find available training-related jobs. Observing these "nonplacements" leads us to the following conclusions.

First, some students appear to enroll in occupationally specific job training even though they lack a strong commitment to an occupational area. This does not, in our view, reflect negatively on occupationally specific training. Rather, it suggests that secondary education may need to provide attractive, high-quality alternatives to occupationally specific training and traditional academic offerings to meet the needs of those students not ready to commit to an occupational specialty or to enroll in a standard college preparatory program. The curriculum alternative we envision could provide broad occupational training and integrated academic and vocational instruction.

Second, the apparent difficulty of matching vocationally trained students with training-related jobs suggests that all occupationally specific vocational programs need to provide aggressive job placement assistance for their students. More generally, occupationally specific programs need to be structured so that they are in tune with the needs of employers. This task will be made much easier if the range of vocational offerings is expanded to include broad as well as specific occupational training. The existence of vocational courses with different, but clearly stated objectives should permit occupationally specific programs to concentrate on providing students with advanced occupational competencies and placing them in skilled, training-related jobs.

A final factor that accounts for the under-utilization of occupationally specific courses is the large incidence of low skilled jobs among youth aged 18 through 22. As of fall 1983, we estimate that 34 percent of the jobs held by female graduates of the class of 1982 were in low skilled occupations. For men, the corresponding number was 22 percent. This situation can undoubtably be traced to many sources including high job turnover among youth, a slack economy, and poor academic and occupational competencies among some youth. Secondary education may be able to contribute to an expansion of high skilled jobs for youth by ensuring that students are well prepared academically and vocationally and by developing better links with employers, particularly those employers that train skilled workers.

What Is the Contribution of Vocational Education to Mathematics Learning?

Since the early 1980s, the academic reform movement has focused attention on improving the educational performance of students. Although vocational education constitutes 18 percent of the high school curriculum, its actual and potential contribution to academic learning is unknown. We sought to determine whether the applied or "hands on" approach to learning that is characteristic of vocational education could be effective in teaching academic skills to groups of students who find traditional math, English, or other core subjects too abstract.

An examination of change in math scores during the 11th and 12th grades for a nationally representative sample of students from the high school class of 1982 revealed that vocational courses in applied mathematics (e.g., business math, vocational math) and vocational courses that included substantial math content (e.g., electronics, drafting, accounting, agricultural science) were associated with significant gains in math learning. Math-related science courses, such as chemistry and physics, also made a large contribution to gains in math proficiency. These results support the general notion that significant gains can occur in applied settings when courses are heavily enriched with math content.

These results are particularly important for youth who are not college bound. Such youth experienced significant math gains in a variety of applied course settings in vocational education and science. Moreover, youth not bound for college tend to take very little traditional math, particularly during their last two years of high school. They take a large amount of vocational education, about two-and-a-half times more vocational education than math.

Although math-enriched vocational courses result in math gains, most vocational courses provide no math growth. Our research indicates no gain in math skills from traditional vocational courses that are not math-related. Since most vocational education (about 80 percent) was not math-related as of 1982, if vocational education is to play a larger role in boosting the math proficiency of students much of the current vocational curriculum would need to be substantially revised and upgraded. The finding that applied courses and some vocational education are already contributing to mathematics achievement is promising, and NAVE research has documented efforts in a number of schools to integrate academic and vocational education.

Policy Recommendations for Secondary Vocational Education

We find major needs for improving secondary vocational education and promising opportunities for proceeding. The results of our analyses lead us to propose six major objectives for federal policy on secondary vocational education. The intent of the policy would be to stimulate reform in vocational education comparable in scope to that of the academic reform movement. The six objectives are:

> *Revise and rebuild the high school vocational curriculum* to upgrade skill levels and provide students with the mix of occupationally specific and transferable skills they need to get good jobs or to pursue further training and education at the postsecondary level.
>
> *Integrate high school academic and vocational curricula* so that students come to vocational programs well equipped with fundamental academic skills and that vocational courses provide an applied context, based on broad and specific job

training, that reinforces and enhances academic skills and motivates students to excel in both academic and vocational courses.

Accelerate the education of at-risk students by providing them with the extra assistance they need to succeed in demanding and highly rewarding vocational courses.

Expand efforts to place students in good jobs that make full use of their vocational and academic training.

Improve the linkages between secondary and postsecondary training so that training is highly complementary for the large group of students who obtain instruction at both levels.

Raise the quality of vocational programs in schools with high concentrations of poor and low achieving students.

To accomplish these objectives, NAVE recommends concentrating federal resources on the schoolwide improvement of vocational programs in schools with high concentrations of students at risk. At the state level, the emphasis would be on encouraging the reform of vocational education and its integration with academic education, and on increasing the capacity of states to implement improvement goals and allocate resources based on the performance of vocational institutions and programs. The policy has five components:

Performance Indicators. Each state would develop performance indicators to measure the success of vocational education for different populations of students and to achieve reform. The indicators would include information on academic achievement, vocational attainment and occupational skills, employment outcomes, and the continuity of student training between secondary and postsecondary levels. States would report on student performance within two years of reauthorization.

State Reform Plans. To create a climate for reform in vocational education, states would develop and submit to the federal government plans for accomplishing the six reform objectives. The plans would be a contract for performance rather than implemented as specifications for documenting compliance. The plans would focus on the entire system of secondary vocational education in a state, not just federally supported programs. Each state would emphasize the improvements it needed, such as upgrading its vocational teacher education and certification programs, expanding placement activities and job opportunities for youth, or linking secondary and postsecondary education.

Local Improvement Grants. Seventy percent of the Basic Grant would be competitively awarded for upgrading vocational programs from among the schools with high concentrations of disadvantaged students. The grants would be for a limited number of years. They would be at least $50,000 per year for small schools and $100,000 a year for large schools. The grants would provide support for local schools to align and integrate academic and vocational education; increase the placement of students in jobs that use the skills acquired in high school; increase the continuity of training between secondary and postsecondary institutions; ensure that at-risk students, including students likely to drop out, handicapped students, limited-English-proficient students, teenage parents, and women enrolled in nontraditional programs, obtain the assistance necessary to enroll and succeed in upgraded programs; and design and collect performance data to measure the success of the local improvement effort. Eligibility to compete for Local Improvement Grants should be limited to schools with the largest concentrations of disadvantaged students. The competitions would include 50 percent more schools than there are funds available to support.

Program Demonstration Grants. Ten percent of the Basic Grant would be competitively awarded among all the schools in a state to conduct demonstrations and rigorously evaluate innovative approaches to vocational education. The program would expand the base of knowledge about effective practices in vocational education. Schools receiving an award would develop a program to accomplish one of the six reform objectives rather than the overall upgrading of programs. A portion of the sites would be nominated by the states for federal evaluation and selected on a joint federal-state basis.

Experimental State Assistance Grants (A $50 million separate authorization in the National Programs title). The last component of the secondary policy would be to test alternative ways of linking performance and improvement through allocating resources on the basis of information from indicators. The 10 percent of states that demonstrate the greatest progress in developing indicators would receive allotments of funds to award grants of assistance to local schools according to the results of indicators. States would be encouraged to experiment with a variety of approaches. Some states might widely disseminate performance reports; others might incorporate performance information into existing state performance standards. Some might provide grants of assistance to low performing schools, to schools showing the most improvement, or to schools performing the best against their peers. The state experience with linking resources to indicator information would be valuable in the next cycle of reauthorization for the federal legislation.

States would be permitted to spend 20 percent of the Basic Grant for secondary education to develop performance indicators and implement reform plans.

In addition, a strong nonsupplanting provision should be included in the legislation and implemented.

POSTSECONDARY VOCATIONAL EDUCATION

Status of Postsecondary Vocational Education

Who Enrolls in Postsecondary Vocational Education?

Postsecondary vocational education is a growing enterprise that is central to the educational mission of less-than-baccalaureate institutions. There are a total of 4.3 million "vocational" students at community colleges, two-year technical colleges, public vocational technical schools, and proprietary schools. Three-fourths of all students at these institutions major in vocational subjects, and over the past two decades the percentage of postsecondary students enrolled in vocational education has grown substantially.

o Community colleges are the major providers of postsecondary vocational education, accounting for 62 percent of all postsecondary vocational credits earned.

- Compared to four-year institutions, two-year postsecondary institutions are much more likely to attract a crosssection of students by age, race, socioeconomic background, and level of ability.

- The largest increase in the rate of college attendance in the past decade has been among high school students who majored in vocational education.

At What Rates Do Students Complete Postsecondary Vocational Programs?

The major problem facing postsecondary vocational education is that many students do not stay in school long enough to receive in-depth training. Low rates of program completion and a limited number of courses taken are common for all students regardless of race, gender, economic status, or ability. The problem is most serious, however, among minorities, economically disadvantaged students, and the growing number of high school "vocational" students who pursue postsecondary training. Minorities and disadvantaged students average substantially fewer credits and leave postsecondary institutions without earning a degree or certificate more frequently than do other students.

- Only 19 percent of high school graduates who enter community colleges shortly after leaving high school complete a certificate or associate degree within four years of completing high school.

- One-third of all postsecondary "vocational" students take less than 12 credits in vocational subjects and 50 percent of vocational students earn less than 24 vocational credits. Typically, 30 total credits of academic and vocational subjects are required for a certificate and 60 credits are needed for an associate degree.

- At community colleges, black students earn 30 percent fewer credits than white students, and black students fail to earn a degree or certificate at a rate 20 percent higher than white students.

What Are the Outcomes for Students?

For students who accumulate substantial amounts of vocational credits or complete programs, postsecondary vocational education pays off in economic terms. Students who obtain degrees or certificates, or who otherwise take a substantial amount of vocational training in their major field, are more likely to be employed and more likely to get a job in their field of training than students who take small amounts of vocational training. Students who take more training and are employed in their field also earn higher wages than students who take less training or are not employed in the field in which they trained. These results are for students 5.5 years after graduation from high school.

- Overall, about 58 percent of postsecondary vocational course work was related to the jobs students later obtained.

- Students who completed 30 credits in their major area were 28 percent less likely to be unemployed than students who completed 1 to 12 credits, and 14 percent more likely to get a job related to their training.

- Students with 30 vocational credits related to their job earned an average of $7.52 per hour compared to $6.59 per hour for students with 12 job-matched credits.

- The economic benefits of vocational training are largest for courses taken in a student's major field or subject area. Vocational credits taken outside the students' major field are not used and contribute little to earnings.

These findings strongly indicate the need to help students choose a field of study, construct a coherent sequence of courses in that field, complete the courses or program, and find a related job.

How Is Postsecondary Vocational Education Financed?

Considered together, federal and state policies of financial support to postsecondary vocational education accomplish two major objectives. First, both federal and state policies support access to postsecondary vocational education--federal policy through student aid and loan programs, and state policy through the direct support of public two-year colleges and other vocational-technical institutions. Second, federal policy supports access to the private sector in postsecondary vocational education (mostly proprietary schools), while state and local policy primarily supports access to public sector institutions. State and local support allows institutions to keep tuition low. Perkins Act funding is small relative to both of these other sources.

- The Perkins Act provides about $320 million in grants directly to public sector institutions--community colleges, technical colleges, and vocational-technical institutes.

- NAVE estimates that two-year public colleges obtain 65 percent of their total revenues from state and local government.

- Federal student grant and loan programs provide $4 billion to postsecondary vocational students. Of this aid, $2.8 billion, or 71 percent of the total, is received by the 14 percent of postsecondary vocational students who attend proprietary schools. A total of $853 million in federal student aid is awarded to the 83 percent of postsecondary vocational students who are enrolled in community and technical colleges. A total of 81 percent of proprietary school students receive federal aid compared to 20 percent of the students at public two-year colleges and 42 percent of the students at public vocational schools.

- Federal student aid is distributed proportionately to family income and the cost of attending different types of institutions. This federal investment contributes substantially more to the access of lower income students to postsecondary vocational education than is possible through the Perkins Act.

- The major forms of financial support for vocational training are student aid and state and local appropriations, both of which provide powerful incentives for institutions to maintain and increase enrollments. Neither provides strong or direct incentives, however, for institutions to address the problems of limited course-taking, low completion rates, or low rates of training-related job placements.

Policy Recommendations for Postsecondary Vocational Education

In considering the role of federal policy in postsecondary vocational education, it is important to emphasize that, although funds from the Perkins Act are limited, other federal programs make a substantial investment in improving access to postsecondary training for disadvantaged students. Public policy offers few incentives for improving student outcomes. Our research has identified noncompletions and limited course-taking as serious problems for all groups of students, but particularly for special population groups. Therefore, improving student outcomes, especially for disadvantaged students, is the main problem that federal vocational education policy should address.

To solve the problem, federal policy in postsecondary vocational education should have three major goals:

Improve rates of program completion and placement in training-related jobs.

Provide special assistance to at-risk populations for whom the problem of noncompletion is most serious.

Improve the transition from secondary to postsecondary vocational education in a way that results in more coherent and in-depth training for students.

To achieve these goals, NAVE recommends using the limited federal resources provided to postsecondary vocational education through the Perkins Act to support the state-level development of indicators to measure the performance of institutions and, within four years of reauthorization, the distribution of funds to institutions according to their positive results for students. Extra incentives would be created to improve outcomes for students at risk--disadvantaged students, handicapped students, single parents, and female students enrolled in nontraditional programs. The recommended policy has five parts:

Performance Indicators. States would develop indicators of the performance of postsecondary institutions. These indicators would measure the performance of postsecondary vocational institutions in three main areas:

- Labor Market Outcomes, including the rates at which students are placed in jobs, whether the placements are "training related," the duration of employment and unemployment, and the level of earnings at job entry and selected times thereafter.

- Learning Outcomes, including the rates at which students attain state certification (in fields with certification), achieve occupational competencies, and improve their scores on tests of academic knowledge.

- Educational Attainment, including the rates at which students earn degrees and certificates, take courses in a sequence, and enroll in more advanced level courses such as intended by a tech-prep or other similar programs.

Performance Funding. States would distribute funds from the Perkins Act according to the performance of institutions as measured by the indicators developed. Institutions with excellent performance would receive higher rewards. Because improved performance could increase enrollment and retention of students, which in turn is the major determinant of institutional revenue, performance incentives would encourage institutions to use their own resources beyond federal funding to improve programs and outcomes for students.

Serving Special Populations. The fairness of any performance-based system requires that performance ratings not penalize those institutions that enroll at-risk students or are located in areas where employment opportunities are limited. To ensure this, federal policy would require that the performance systems developed by states: (a) adjust for major factors, particularly student characteristics and labor market conditions, that affect student performance but are outside the control of vocational educators; (b) reward both institutional improvement and "value-added" increases in student learning from entry to exit; and (c) provide substantial additional weight in funding formulas, perhaps as much as 50 percent, for the performance of students in special population categories.

Two Phases. Performance funding would be phased in over four years. In the first two years, states would develop performance indicators; in the next two years they would develop formulas for performance funding. In the fourth year, federal funds would be allocated on the basis of performance.

Lead Agency. The governor would designate a lead agency to develop and administer state performance systems. The governor would also provide a broad view of the relationship between vocational programs and other state job-training and economic development needs. The lead agency could spend up to 20 percent of the Basic Grant funds available for postsecondary education for the development of performance indicators and funding formulas.

FEDERAL ROLE

The federal policies proposed above imply a strengthened federal role in vocational education. The policies would also require changing certain provisions of the current legislation.

Federal Leadership in Educational Reform

The federal office must work with the states to foster school-level improvement, serve special populations, develop performance indicators, and bring vocational education into the larger movement for reform in education. The federal office would:

- Work with top-level state leaders to broaden public support for the reform and improvement of vocational education.

- Create a National Panel on Vocational Education Indicators and, with its advice, recommend priorities for indicator development by the states.
- Provide technical assistance to the states on indicator development.
- Work with the states to identify, demonstrate, and evaluate promising policies and programs, and conduct national evaluations.

Broadening public support for the reform and improvement of vocational education is important for accomplishing the goals of the proposed policies for secondary and postsecondary vocational education. As in the case of academic reform, the success of vocational reform will rest, ultimately, with the states and localities that set goals and carry out programs.

Vocational Education Indicators

The performance indicators to be developed by the states are intended to encourage reform. The information derived from the indicators is intended to create incentives for reform by provoking questions from vocational education officials, legislators, governors, teachers, students, parents, employers, and others about what vocational education is accomplishing and what it should accomplish. The information will also assist state officials in setting goals and direction for the improvement of vocational education. A critical role for the federal office will be to provide guidance to the states on measurement priorities and expert technical assistance in indicator development.

Evaluation

The systematic development of knowledge about effective practices in vocational education is an important way to magnify the impact of limited federal dollars. The evaluation effort would focus on the development of proven practices in the areas of reform outlined above for secondary and postsecondary vocational education. Promising sites from the Local Demonstration Grants program would be nominated and selected for evaluation through a joint federal/state process. The evaluations would be conducted by the federal government through third-party contractors.

INTRODUCTION

Section 403 of the Carl D. Perkins Vocational Education Act of 1984 (P.L. 98-524) calls for a national assessment of vocational education to be conducted by the Department of Education. The purpose of this assessment is to provide information that will help Congress in reauthorizing federal vocational education legislation. The study is also designed to inform educators and policymakers at all levels about the size, scope, organization, and effectiveness of vocational training, and the relationship between federal vocational education policy and local practice.

Goals of Federal Policy

The process of authorizing federal vocational education legislation provides an opportunity to address issues of vocational content and quality, equity and effectiveness, and the capacity of the system to respond to the requirements of a changing economy. These issues are especially important for more than half of the nation's youth who go to work directly after high school. They are equally important to the adults who enroll in the system of postsecondary occupational education that has grown dramatically over the past 20 years.

The major challenge facing Congress in reauthorizing federal vocational legislation is to consider the goals of federal policy and determine whether the structure of the current Act is appropriate to serve those goals. The primary goals of the current Act are twofold: (1) to improve and modernize vocational education to meet the needs of the work force and promote economic growth; and (2) to ensure that disadvantaged and handicapped students, and other special populations, have access to quality vocational education programs.

To accomplish these goals, the Act prescribes target populations, allocation mechanisms, and required or desired services. Fifty-seven percent of the Basic Grant is set aside for services to six special population groups: disadvantaged students, handicapped students, adults, single parents and homemakers, persons in nontraditional training for their sex, and incarcerated individuals. The rest of the funds are earmarked for program improvement, modernization, and expansion. The set-asides for handicapped and disadvantaged students are to be distributed to eligible recipients through a federally specified intrastate formula while the rest of the Basic Grant may be distributed by states in any manner they choose. The Act includes a set of services to which all handicapped and disadvantaged students in vocational education are entitled in any district that receives support under those set-asides. Finally, except for the entitlement provision, the Act applies equally to secondary and postsecondary education.

While the goals may be ambitious, they must be viewed in light of available resources. In FY 1989, for example, $826 million was available under the Basic Grant. This amount was spread among the six population groups (in legislatively specified amounts for each group) and program improvement, among large numbers of eligible recipients at both secondary and postsecondary levels, and a portion was retained for statewide projects. In this environment, the Act is, in reality, a series of separate, small grant programs and the danger of fragmentation of resources is clearly present.

The problem of fragmentation is not new. The congressionally mandated study of vocational education completed in 1981 concluded that federal policy then in force "attempted too much with too few resources." The Perkins Act did, in fact, narrow the goals of federal legislation and sought to target resources more effectively by mandating some services and introducing the intrastate formula and a provision that 50 percent plus $1 of federal funds be spent in economically depressed areas. How well these and other provisions have accomplished their purposes is one subject of this report.

Changes in Education and the Economy

Federal policy must be viewed within the context of fundamental changes in education, the economy, and the composition of the population that are shaping and will continue to affect the demand for vocational training through the end of the twentieth century. At the secondary level, the academic reform movement and continuing efforts to improve the quality of schools have been significant education developments, akin to *Brown v. the Board of Education* or the passage of the Elementary and Secondary Education Act of 1965. Most states and local districts have raised high school graduation requirements; many have introduced or expanded testing programs for teachers and students, established new requirements for teacher certification, and raised teacher pay. A host of new organizational strategies for school management, accountability, teacher performance, and parental choice have been adopted or are currently under consideration.

The school reform movement has largely bypassed vocational education at state and local levels. In only a few states has vocational education played much role in education reform. Sometimes educators have viewed vocational education as part of the problem, hoping that increased academic requirements would force students to take less vocational education and the programs would slowly disappear.

Yet vocational education is too large and too important to be written off as a component of educational improvement. Our research indicates that 20 percent of all high school course work is taken in vocational subjects. For work-bound students, the group that needs a solid academic grounding and vocational skills most immediately, nearly 30 percent of their time in high school is spent in vocational education. Simply put, with so much of high school course work in vocational subjects, educators and policymakers cannot afford to ignore its actual and potential contribution to student achievement and job preparation.

Congress must also shape federal vocational education policy in the context of the changing demand for technical and occupational skills. In the 1980s, the disparity in earnings between college- and noncollege-trained persons increased substantially. The widening gap in earnings reflects, in part, the continuing decline in the availability of low skilled but highly paid work. In the future, those who lack the skills needed to be productive may face a lifetime of low wages or economic dependence. At both secondary and postsecondary levels, there is an urgent need to reexamine the mix of academic and vocational preparation to determine how best to ensure that the work force possesses appropriate and adequate training.

Finally, the composition of the work force is changing. As the population ages, there will be fewer new workers in relation to total population. At the same time, the work force will be drawn increasingly from minorities and immigrant groups that have had fewer educational or economic opportunities in the past. Preparing students for employment will require linking traditional job training with instruction in basic skills and language proficiency. It may require that educational institutions bridge the gap between instruction and job placement in new and innovative ways.

Plan of the Report

This volume of the National Assessment of Vocational Education final report is the first of five. It summarizes the most important findings of our studies and presents policy recommendations. The report is divided into four chapters: implementation of the Perkins Act, secondary vocational education, postsecondary vocational education, and the federal role in vocational education. The separate discussions of secondary and postsecondary vocational education reflect our conclusion that the policy issues and organization of instruction differ significantly between these levels. If federal policy does not distinguish the unique issues facing each sector it will not be sufficiently precise to address either sector adequately.

The first chapter reports the findings of research on the implementation of the current Act. In assessing the current legislation, three broad topics are addressed: (1) Are federal funds distributed in ways that enable localities to address the goals of the legislation? (2) Are the services provided appropriate and adequate to meet the social and educational needs that motivate the Act? and (3) Do districts and institutions use Perkins Act funds to provide services or programs that would not otherwise be available to students? Based on this analysis, we have concluded that the current Act is a weak policy instrument to ensure high-quality services or bring about major changes in vocational education.

The chapter on secondary vocational education describes current rates of participation in vocational education and trends in participation over a 15-year period. It highlights the degree to which special populations have access to high-quality vocational education. The discussion considers whether vocational education contributes to students' basic skills and makes recommendations for enhancing its contribution. The chapter also examines the extent to which work-bound students obtain jobs that use the skills they learned in high school. This chapter concludes with policy recommendations designed to increase the targeting of federal funds to schools in need, stimulate state-level reform of vocational education, and introduce performance indicators to better gauge how well vocational education is operating.

The chapter on postsecondary vocational education summarizes research findings in five main areas: (1) enrollments in postsecondary vocational education; (2) educational attainment (total course-taking and program completions); (3) the effects of postsecondary training on employment, job placement, and earnings; (4) organizational approaches in high-quality programs; and (5) the financing of postsecondary vocational training. The chapter concludes with a recommendation that federal policy require states to develop performance indicators geared to student outcomes, and that federal vocational education funds allocated to postsecondary education be distributed among institutions on the basis of performance ratings.

A final chapter discusses policy recommendations common to secondary and postsecondary portions of the legislation. These include the proposed federal role in reforming vocational education and other changes in legislation that apply to both sectors. While consistent with the current policy objectives of increased access and program improvement, our recommendations for secondary and postsecondary vocational education would move federal policy in a fundamentally new direction, toward performance-based accountability.

CHAPTER 1

IMPLEMENTATION OF THE PERKINS ACT

This chapter summarizes the portrait of funds distribution and use presented in the final report volume on the implementation of the Perkins Act.[1] We also consider whether funds reached their intended beneficiaries and were used well. For each major portion of the Basic Grant we summarize findings on the distribution of funds among eligible recipients and populations, and address the following questions:

- Do the services that are purchased help to meet the goals of the legislation?
- Are services appropriate and adequate to address the social and educational problems that underlie the Act?
- Do districts and institutions use Perkins Act resources to carry out activities that are additional (additive), or would they undertake them in any event because of local needs or because they are compelled to do so by other policies and requirements?

To answer questions about the appropriateness of services provided, we examine what we have learned from assessment of the Act itself, as well as from studying the targeting and expenditure of funds, considering what is known from other sources about the needs of special populations or reform in vocational practice. We draw on information about rates of participation in vocational education and other issues discussed more fully in the NAVE report on access to high-quality vocational education, as well as in earlier NAVE publications.

It is impossible to answer the "additivity" question conclusively. Because federal funding has been a portion of the support for vocational education for almost 75 years, it is impossible to know what vocational education would look like without it. States and many localities rely on receiving federal subsidies for certain activities from year to year. These expectations affect their priorities and behavior in ways that cannot be measured. With respect to which activities might not have taken place without the Perkins Act, all answers are, ultimately, suggestive rather than definitive. Nonetheless, we can make some observations about additivity that may help inform future legislation.

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[1] Reports on which this chapter is based include: Mary Ann Millsap, Christine Wood, Joann Jastrzab and Camille Marder, *State and Local Response to the Carl D. Perkins Act. Case Study Analysis Final Report*, NAVE Contractor Report (Cambridge, MA: Abt Associates, Inc., 1989) and Janet P. Swartz, *State and Local Response to the Carl D. Perkins Act. Survey Report. Final Report*, NAVE Contractor Report (Cambridge, MA: Abt Associates, Inc., 1989). For a complete listing of the sources of the implementation study see Lana D. Muraskin, *The Implementation of the Perkins Act*, Final Report Volume II (Washington, DC: National Assessment of Vocational Education, U.S. Department of Education, 1989).

STATE ADMINISTRATION OF THE PERKINS ACT

Across the country there were great differences in the rates at which states allocated Perkins Act funds among secondary and postsecondary sectors in 1986-87, with postsecondary shares ranging from 8 to 100 percent (see table 1.1). We estimate that, nationally, close to 40

Table 1.1

Percentages of Federal Vocational Basic Grant Funds Distributed to Postsecondary Education Among the States, 1986-87

Percentage of Federal Funds	Number of States
0-10%	1
11-20	7
21-30	7
31-40	10
41-50	9
51-60	5
61-70	6
71-80	1
81-90	0
91-100	2
	48

SOURCE: NAVE, *Second Interim Report* (Washington, DC: U.S. Department of Education, 1988).

NOTE: The number of states (and the District of Columbia) totals less than 51 because of missing information.

percent of funds were spent at the postsecondary level (see figure 1.1). Among the most important findings:

- There was little apparent relationship between regional rates of secondary participation in vocational education and the rate of allocation of federal funds to the secondary level.
- Per-pupil federal allocations at the postsecondary level varied from $20 to $742 based on head count enrollments in two-year public institutions. Secondary allocations ranged from $0 to $132 based on enrollments in grades 9 through 12.

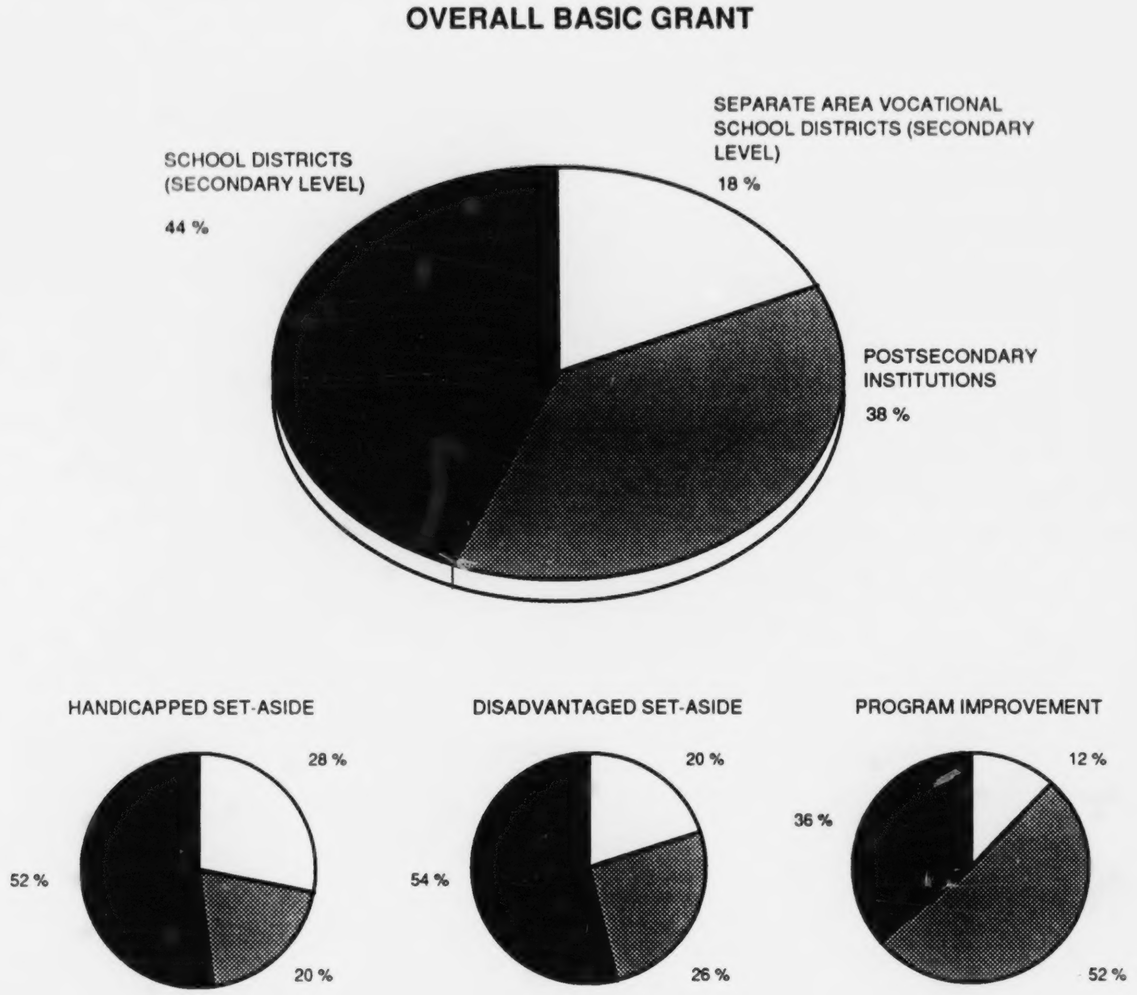
In states we visited during case studies, the state office administering the Perkins Act was always responsible for secondary vocational education, but in only one of the nine states was that office responsible for all secondary and postsecondary vocational education. In four of the states the office administering secondary vocational education was responsible for postsecondary area vocational schools, a portion of the postsecondary system. In at least half the states visited, the office administering the Act was able to limit the eligibility of institutions not under its purview to grants under the Act. Most of the states had a preset portion of funds available for secondary and postsecondary education or for particular institutions. The unequal distribution of resources across sectors and institutions meant that intended beneficiaries in a given sector or set of institutions were considerably more likely to receive support in some states than in others.

Separate area vocational school districts appear to have received a disproportionate share of the federal funds that flowed to secondary education. Area school districts and postsecondary institutions received much larger grants than school districts both in the size of individual grants and on a per-pupil basis.

- About 62.5 percent of school districts spent funds under the Perkins Act and the median grant to a school district was $7,910. Seventy-five percent of awards were $25,000 or less. We estimate FTE vocational expenditures at approximately $100. Large districts were significantly more likely than small districts to spend funds.
- In contrast, 90.8 percent of separate area vocational school districts spent funds with a median expenditure of $91,309 and a 75th-percentile award of $153,629. We estimate FTE vocational expenditures at $215.

FIGURE 1.1

Expenditures Of Perkins Act Basic Grant Funds By School Districts, Separate Area Vocational School Districts, And Postsecondary Institutions, 1986-87



SOURCE: Janet P. Swartz, State and Local Response to the Carl D. Perkins Act, Survey Analysis, Final Report (Cambridge, MA: Abt Associates, Inc., 1989)

- Separate area vocational school districts received 30 percent of all Basic Grant funds awarded by states to secondary institutions and delivered less than 10 percent of the total credits of vocational education taken by students.

- At the postsecondary level, 79.6 percent of institutions with vocational enrollments in our sample spent Perkins Act funds. The median expenditure was $92,395 and the 75th-percentile expenditure was $190,589. We estimate FTE vocational expenditures at $240.

The small size of grants received by regular school districts limit seriously the possible effects of federal funding. Median grants of less than $8,000 are not sufficient to pay even a portion of the cost of developing and implementing significant improvements in programs of vocational instruction. Furthermore, these grants typically consist of funds from two or more Perkins Act set-asides and may go to more than one school within the district that receives the funds. As a result, funds spent for any one purpose in a single school can be extremely small. Finally, it must be remembered that these small grants are a significant proportion of total Perkins Act funds awarded to secondary institutions. Since 70 percent of the Basic Grant funds for secondary education flow to regular school districts, at least 35 percent of all the funds to the secondary level are awarded in amounts less than $8,000.

IMPROVING VOCATIONAL ACCESS AND UPGRADING SERVICES FOR DISADVANTAGED STUDENTS

Do the Resources Reach Those Most in Need?

If we assume that the students most in need are concentrated in places with the highest poverty rates, the picture that emerges from this study is mixed. First, the interstate distribution of Perkins Act funds and the poverty rates for youth are not significantly related. Within states, both the survey of eligible recipients and the analysis of GEPA data indicated that total Basic Grant resources are somewhat greater in school districts with the highest rates of poverty.

- The average poverty rate for youth in school districts spending funds was 16.2 percent. In districts without funds the rate was 15.5 percent.

- Poverty was positively related to receiving support under the disadvantaged set-aside, but negatively related to spending funds under the single parent, sex equity, and program improvement portions of the Act.
- Per-pupil Perkins Act expenditures were, on average, $32.21 in districts with the highest poverty rates, $19.50 in districts with medium poverty rates and $15.00 in districts with low poverty rates.
- The additional funding increment for districts with high poverty did not carry over to districts with the highest concentrations of minorities, single parent households or limited-English-proficient persons.

The introduction of the intrastate formula and the requirement that 50 percent plus $1 of the Basic Grant be distributed to economically depressed areas did not appear to have affected the share of resources going to high poverty school districts since these shares remained relatively unchanged between 1981 and 1986. There are no adequate measures available to determine the targeting of resources to area vocational districts by poverty levels.

At the postsecondary level there was some evidence of inverse targeting by poverty. Institutions with larger percentages of students receiving Pell Grants were less likely than institutions with smaller percentages to spend funds under the Perkins Act. It is important to remember, however, that most of the postsecondary institutions in our sample received awards, and that our measure of economic need for postsecondary institutions (Pell Grants) is a weak one.

For the disadvantaged set-aside alone, we found that school districts with the highest poverty rates had a greater likelihood of receiving an award, and their per-student disadvantaged (and handicapped) set-aside awards were larger than those of other districts. Within districts, however, our case studies were unable to uncover any systematic means for funds distribution or for service provision based on student or programmatic characteristics. Many districts did not know how many students were eligible for services, and some did not know how many were actually served. The only systematic distribution mechanism we uncovered through the case studies was a tendency to locate services in facilities other than comprehensive high schools--such as area vocational facilities, vocational high schools, and alternative schools.

Perhaps most important, typical set-aside grants appeared to be too small to provide much service under any circumstances.

- In regular school districts the median grant under the disadvantaged set-aside was $4,000. Three-quarters of all awards were $14,054 or less.
- By contrast, area vocational school districts spent an average of $27,418 under the disadvantaged set-aside. The 75th-percentile award was $62,295.

Not surprisingly, area school districts were more likely than regular school districts to spend their grants on instructional services. School districts were more likely to buy ancillary services such as counseling and assessments.

The concentration of resources in special facilities--area schools, alternative schools, and the like--means that funds are less likely to be spent to upgrade vocational programs in comprehensive high schools, where about 85 percent of all vocational courses are taken. Data presented in the NAVE report on access suggest that students in high schools with the greatest concentrations of poor students are less likely than other students to have access to area vocational schools or to a wide range of vocational offerings in comprehensive high schools. The policy question raised by the combination of findings is clear: Should federal legislation be concerned primarily with upgrading the quality of the programs taken by most disadvantaged (and advantaged) students in comprehensive high schools, or should it actively encourage more disadvantaged students to attend special facilities? Most broadly, should funds follow the students or should they flow to institutions most in need?

Are the Services Provided at the Secondary Level Appropriate?

In the case studies we found that most services were provided to academically disadvantaged students. Services included counseling--especially assessment--and academic remediation, with related equipment purchases. Services were provided to students who qualified under the definitions in the Act, but few were linked to increasing the access of those students to high quality vocational education or otherwise upgrading their offerings. Most services were provided without reference to changing the vocational program in which the student was enrolled. Assessments were provided to students who were eligible according to federal definitions; remediation or other instructional assistance was provided when students had general academic difficulties or specific difficulties affecting their vocational performance. Local administrators told field staff that few additional resources were available from other sources to support academic remediation at the secondary level.

According to case study findings, the most common approach to provision of academic remediation was to identify students who were enrolled in vocational education and who appeared to be having academic difficulties as measured by standardized tests or informal means such as teacher opinion, and refer them to learning laboratories or special classes. According to the case studies, academic remediation might address math or English skills related to a current vocational course, but that link was not always evident. Sometimes the main criterion for remediation at the secondary level was the need to pass a minimum competency examination for graduation. Although the Perkins Act says that academic remediation must be "related" to the student's vocational program, the regulations do not specify how "relatedness" is to be established. In the absence of such rules, some localities apparently have used Perkins Act funds to offer or augment general academic remediation. Survey results suggest a greater use of federal funds for aides in vocational classes than do case study findings.

Testing and other assessment devices may be good diagnostic and motivational tools, but we found that it has proven difficult to fit the assessments conducted with Perkins Act funds into an overall "access improvement" plan for a student. Although an assessment could be an important first step in finding the most challenging vocational program, in many schools it is an isolated event of little consequence to vocational placement. In many sites, academically (or economically) disadvantaged students already enrolled in vocational education are provided with a battery of interest and ability tests and other measures designed to identify the training and jobs for which they are suited. Yet in interviews with counselors and administrators, field staff found that, in many cases, the assessment does not play much role in placing a student in a particular vocational program.

Counselors and teachers were sometimes unclear about what to do with the results of vocational interest or ability tests. Often the assessment was viewed as motivational--alerting students to the large number of different job choices for which they might be suited and perhaps broadening their career horizons. In small towns and rural areas particularly, the district's offerings or the local job possibilities were quite limited, so there was no way students could enroll in programs of their choice. In many sites, the persons conducting the assessments spoke of the need to provide training to counselors and teachers on ways to use the information, but the problem appears to be much more basic. The program reform goals of the Perkins Act have not been translated into practice through the assessment process.

At the secondary level, services were rarely provided to economically disadvantaged students who did not have academic deficiencies. This decision seems reasonable given the types of services that were provided. In the few case studies where economic disadvantage was a criterion at the secondary level, the service was likely to be an assessment. (The one exception in the case studies was day care for teenage parents, supported under the single parent set-aside.) In survey results, few disadvantaged set-aside funds were spent for economic assistance, such as paid work experience, designed to enable poor students to enroll or complete vocational programs. Nor was job placement more than a rare use of Perkins Act funds, even though poor students might need jobs at or before completion of their educational program.

In general, school personnel were understandably uneasy about singling out students for help on the basis of economic characteristics that did not appear to be linked to achievement and might have stigmatizing effects. Serving poor individuals makes sense in some cases--for example, providing financial aid to stay in school. In general, however, targeting to economic disadvantage appears to make sense only with respect to institutions (i.e., across schools), for upgrading the quality of offerings to which poor students have access. In other words, the hope that the Perkins Act would serve as an incentive to upgrade vocational programs in schools where poor students are concentrated, and that the federal funds would be used to provide the additional help needed to succeed in more challenging offerings, has not been realized.

Requirements in the Perkins Act contribute to the difficulty, because several provisions emphasize service to individual students with deficiencies. These provisions include the definitions of disadvantaged (and handicapped) students who qualify for service, as well as Section 204 (c), the service mandates. These provisions call for a model of service that assumes that the educational offerings are adequate but that certain persons need additional assistance to be successful in those offerings (e.g., students who are handicapped or who read poorly). But the Perkins Act also assumes that a *class* of students (those who are economically disadvantaged) is enrolled in inadequate programs or has not enjoyed the same access to high quality offerings. The solutions continue to be framed in the individual assistance mode, however.

We did not have enough survey or case study observations to reach definitive conclusions about support for limited-English-proficient students. Survey data show that far more districts have LEP students enrolled in vocational education than report explicit Perkins Act expenditures for this group. It appeared, however, that at least some LEP students were receiving additional vocational tutoring in their native language either in vocational classes or outside of class. Case studies confirmed that many districts with federal funds and LEP students enrolled in vocational education were providing no particular services for this group.

Are the Services Provided at the Postsecondary Level Appropriate?

The link between services to disadvantaged students and program access and upgrading was no more highly developed at the postsecondary level. The services delivered were similar to those at the secondary level. A small subset of postsecondary institutions used federal funds to recruit high school dropouts to training programs, however, an activity that directly promotes greater access because many of these students would probably not receive training without it. Academic remediation at the postsecondary level may be even less tied to vocational instruction than at the secondary level, because postsecondary institutions may demand particular levels of academic performance before allowing students to enroll in vocational programs.

Few postsecondary recipients are spending Perkins Act resources on job placement, but many appear to weight services supported through the Perkins Act to the front end--recruitment, assessment, and remediation. Both types of service are important. As described in the NAVE report on postsecondary education, disadvantaged students face barriers to both access *and* completion of degrees and certificates at less-than-baccalaureate institutions. What may be needed, then, are greater incentives to increase institutional and program access and to encourage all students, but especially disadvantaged students, to complete their vocational programs.

Are the Services for Disadvantaged Students Additive?

The substantial use of Perkins Act funds for assessments and other types of vocational counseling suggests that the Act has served to increase these activities. Local administrators interviewed in case studies indicated that they were conducting more assessments than in the years before the Act went into effect; they were aware of the Act's requirement to provide the assessments and credited it with a portion of the increase.

A further indication of the extent to which the Act may have increased the rates of assessment is the survey finding that districts with support under the disadvantaged set-aside were more likely to indicate that they provided assessments to all or most academically disadvantaged students (see table 1.2). There was a positive relationship between receiving funds and providing assessments. Districts with greater funds per capita were more likely than those with less funds per capita to provide assessments. But districts with greater funds were no more likely than those with less or no set-aside funds to provide other potentially additional services stemming from assessments including academic remediation, summer jobs, alternative schools, curriculum modification, and guidance and counseling.

The extent to which the Act provides students with more remediation than they would otherwise have obtained is less clear. At both secondary and postsecondary levels, students may be generally selected for remediation in accordance with their overall academic performance, not their particular difficulties in a vocational program. The remediation is then presumably geared to their academic difficulties. In some school districts, it is explicitly designed to help the student pass examinations or courses required for graduation. In many states, students are entitled to academic remediation under federal or state compensatory education programs or remediation programs tied to state-level academic reforms. In these cases students would seem to be entitled to remediation even without the Perkins Act, although we cannot say that they would get it.

Area vocational school administrators noted that the Perkins Act allows remediation to take place in area schools. Without federal funds that remediation would not be available, so secondary students who needed remediation would not be able to attend the area school. In other words, although students might obtain remediation, the location would be different.

Analysis of local survey responses for school districts indicated no clear connection between receipt of Perkins Act disadvantaged funds and greater amounts of remediation in academic skills (see table 1.2). Districts with lower set-aside funds per pupil were slightly more likely than those with higher per-pupil funds to provide remediation in vocational classes. Those with no funds were less likely to provide remediation in vocational classes but more likely to provide remediation in nonvocational classes. These findings suggest that the availability of funds influences the setting for academic remediation.

Table 1.2

Percentage of School Districts Where "All" or "Most" Academically Disadvantaged Students Received Selected Services, by Level of Per-Pupil Perkins Act Funds, Disadvantaged Set-Aside, 1986-87

	Level of Perkins Act Disadvantaged Set-Aside Funds in District			
Selected Services	None	Low	High	Total
Assessments	68.7	73.5	86.9	78.0
Remediation in vocational classes	55.2	62.6	60.0	60.2
Remediation in other classes	77.5	63.7	50.6	60.9
Summer jobs related to vocational education	26.4	1.74	4.8	7.3
Alternative or school within school	29.6	7.1	6.2	10.7
Modified curriculum	34.7	20.1	25.5	24.8
Guidance and counseling	71.4	79.4	85.1	80.2
Transition guidance	62.6	78.8	78.0	75.6

SOURCE: Additional Analyses of Survey of Local Vocational Education Practices, Decision Resources Corporation, 1989.

NOTE: Per-pupil refers to total enrollment in district, grades 9 through 12.

Given the Act's weak nonsupplanting and maintenance of effort requirements and the lack of any regulatory limits on basic skills instruction "related" to vocational education, allowing funds to be used for basic skill instruction without limitation appears to invite funds substitution.[2] This concern, which applies at both secondary and postsecondary levels, will continue to be important as Congress considers ways to link academic and vocational education in future legislation.

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[2] For an extensive discussion of this issue see Stephen M. Barro, *Federal Goals and Policy Instruments in Vocational Education: An Assessment of the Resource Allocation and Targeting Provisions of the Carl D. Perkins Vocational Education Act of 1984*, NAVE Contractor Report (Washington, DC: SMB Economic Research, Inc., June 1989).

Only full-scale audits could generate evidence to determine the extent to which aides and other instructional staff are additional, and even then findings would not necessarily be conclusive. The use of aides does, on its face, suggest more intensive vocational instruction or other vocationally oriented service. Much of the federal support of instructional services identified in the case studies took place in special settings--area vocational schools, alternative schools, schools within schools. It is quite possible that such institutions have higher per-student costs than comprehensive high schools, meaning that they already incur "excess" costs for students, and the Perkins Act provides an opportunity to support a portion of those costs. If that is the case, it would mean that Perkins Act funds are being "attributed" through bookkeeping to what are already high cost activities, and would demonstrate again the need for an effective nonsupplanting rule at the appropriate level of aggregation (i.e., the school or the vocational program).[3]

UPGRADING ACCESS TO VOCATIONAL EDUCATION AND PROVIDING SERVICES TO HANDICAPPED STUDENTS

Do the Services go to the Students Most in Need?

From the case studies we have learned that services go to students with individualized education plans (IEPs) at the secondary level and to students who have cognitive or physical impairments at the postsecondary level. If there is targeting of resources, it appears to be much the same as for the disadvantaged set-aside--funds tend to flow to special facilities at the secondary level. This is true with respect to the division of funds among school districts and area vocational districts as well as within school districts, the latter information derived from the case studies.

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[3] The disparity between the findings of the survey (that aides were a major outlay) and the case studies (where aides appeared to be a small item) could, in fact, be explained as follows: for accounting purposes, Perkins Act funds are attributed to higher instructional costs for disadvantaged students, but when asked what additional services are provided to disadvantaged students, local administrators point to remediation or assessments.

There was tremendous range in the overall grant sizes and per-student dollars under the handicapped set-aside. Once again, most school districts did not receive sufficient resources to pay for substantial additional service.

- The median set-aside award to a school district under the handicapped set-aside was $3,000. Three-quarters of the awards were $8,000 or less. Forty-eight and a half percent of school districts received awards.
- Area vocational school districts were somewhat better off. Eighty-two percent received awards. The median expenditure was $16,929 and the 75th-percentile expenditure was $31,734.

Even when resources were concentrated on a subset of students in special facilities or programs, however, the per-student dollars were small. The typical postsecondary institution received a set-aside somewhat smaller than that of an area vocational school district but considerably larger than that of a school district.

Are the Services at the Secondary Level Appropriate?

As discussed fully in the NAVE report on access, handicapped secondary students take more vocational education than other students, and vocational education occupies a greater proportion of their total secondary education hours because they take fewer units than other students. In addition, handicapped students obtain most of their vocational education in mainstreamed settings (81.7 percent) and are more likely to be in mainstreamed settings for vocational education than for other studies. Overall, they are not concentrated in preparation for low-level service occupations, although their participation in training for service jobs is slightly greater than that of other students. But sex stereotyped course-taking patterns are more common in the vocational education of handicapped students than that of other students. Despite opportunities in vocational education, handicapped students continue to have high levels of adult unemployment.

Until the NAVE report, no systematic information was available on the participation of handicapped students in vocational education. The Perkins Act is based on the notion that handicapped students have had relatively limited and poorer access to vocational education. We now know that these students do not have less access overall, but the picture with respect to access to high quality programs is mixed. NAVE findings about course participation, combined with evidence of high unemployment rates, point to a need for services that link instruction to jobs.

Findings of the local survey and case studies suggest that Perkins Act resources are used primarily to help pay for the instructional costs of vocational education for handicapped students in both mainstreamed and separate settings, and to provide assessments and other forms of guidance. There is reason to believe that educational costs for handicapped students are substantially higher than those of other students. One recent study found that the cost of special education is 2.3 times the cost of regular education.[4] The cost of handicapped students in self-contained classrooms is 2.5 times the cost of regular education.

In survey findings, instructional spending was divided between mainstreamed and separate classes at rates of about 1.5 to 1 in school districts and 2 to 1 in area vocational districts. This finding is surprising in light of the Perkins Act goal to increase the participation of handicapped students in mainstreamed vocational education. In the case studies we found that about a third of the Perkins Act-funded activities were located in separate classes. Although we found little reason to conclude that the availability of Perkins Act funds was the reason for creating separate classes, excess costs may be more easily justified in those settings. As reported above, the preponderance of vocational classes taken by handicapped students are in regular classrooms.

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[4] See Mary T. Moore, E. William Strang, Myron Schwartz, and Mark Braddock, *Patterns in Special Education Service Delivery and Cost* (Washington, DC: Decision Resources Corporation, 1988). This study did not examine the specific costs of vocational education for handicapped students. The findings reported are averages for elementary/secondary education combined.

Nor did we see funds used for one specific activity--subsidized work experience--that vocational educators concerned with handicapped students have argued is currently neglected. Experts on the vocational education of handicapped students have argued that paid work experience is an important component of successful secondary programs because it bridges school and work. Creating this bridge is particularly important for handicapped students, given their high adult unemployment rates. Perkins Act funds were seldom used to subsidize work experience. In addition, few Perkins Act resources were spent on job placement, but handicapped students, unlike disadvantaged students, have some access to job placement services under other state and federal legislation.

Are the Services at the Postsecondary Level Appropriate?

From the case studies conducted by NAVE, the Perkins Act appears to pay for services to two types of handicapped students at the postsecondary level: (1) persons with physical disabilities enrolled in vocational education and (2) students with cognitive impairments (generally students who had IEPs when in high school). The services for students with physical disabilities described in the case studies do not always appear to be linked to particular vocational programs. Administrators use Perkins Act funds to provide various aids such as readers and wheelchairs.

Although survey findings suggest the use of Perkins Act funds in mainstreamed settings, when we looked only at services for students with cognitive impairments, the postsecondary experience appeared to be a continuation of programs offered in high school. Almost all the offerings identified in the case studies were separate, suggesting that the resources were doing little to increase access to mainstreamed vocational training. Although it is encouraging to find students with cognitive impairments in postsecondary education, questions may be raised about whether these funds might be used to try to mainstream these students, who are motivated enough to stay in school. Otherwise, postsecondary education simply means shared facilities. Given a median postsecondary grant of around $11,000, however, it is doubtful that the Perkins Act could be held accountable for decisions to provide or change education in particular settings.

Are the Services for Handicapped Students Additive?

Secondary Level

Unlike disadvantaged students, handicapped students at elementary and secondary levels enjoy an entitlement under federal and state laws to an individual educational plan and to the services appropriate to carry out the plan. In a broad sense, then, there is little in the way of support or services to which they are not already entitled. The Perkins Act acknowledges that dual entitlement when it notes that its funds may be used to provide and pay for vocational services, even though states or local education agencies would have been required to provide and pay for those services in the absence of the Perkins Act (see Section [a][3][A]).

The question remains, however, whether acknowledging the dual entitlement means that the Perkins Act envisages fiscal substitution. Although policymakers intended that handicapped students would get *more* services with the Perkins Act than without it (as evidenced by the excess cost provision), the Act lacks a strong nonsupplanting provision, so there is no way that additional assistance can be assured.

Specific concern about supplanting is raised by the uses of the set-aside in separate classes for handicapped students. Because these settings are usually more costly than mainstreaming, they incur substantial excess costs by definition. If we assume that these classes would exist even without the Perkins Act, which seems reasonable given the small size of Perkins Act grants, the use of Perkins Act funds to support their excess costs is a direct supplanting of state and local (and possibly other federal) resources. Only a nonsupplanting provision aimed at an appropriate level, such as all services for handicapped students enrolled in vocational education in a school district, would solve this problem.

The small size of Perkins Act grants under the handicapped (and disadvantaged) set-asides, in itself, invites supplanting. Such small amounts of money provide little incentive for districts or institutions to undertake new activities, especially when those activities also entail real additional costs to meet match provisions. As a result, districts may seek ways to use the funds without incurring much additional cost. One way is to identify activities that already incur excess costs to which the Perkins Act funds can be "attributed" in what is essentially a ledger entry. Yet attributing Perkins Act funds to an activity that incurs excess costs without demonstrating increased costs is supplanting. At present, there are no safeguards against this practice in the Perkins Act or regulations. The Perkins Act contains a nonsupplanting provision but no regulations have been issued to implement it.

There is reason to believe, however, that handicapped set-aside funds result in some activities that would not take place in their absence. As can be seen from survey findings, school districts with higher per-pupil grants under the handicapped set-aside were more likely to modify facilities for handicapped students (see table 1.3).[5] They were slightly (but not significantly) more likely than districts without funding to provide vocational assessments, and somewhat less likely to provide assessments than districts with smaller per-pupil awards. There is no significant relationship between higher per-pupil spending and other additional services. Case study findings suggest, however, that the services mandated in the Perkins Act have resulted in more and better contacts between special educators and vocational educators to plan the vocational programs of special education students.

Postsecondary Level

At the postsecondary level, the use of Perkins Act funds for separate classes for handicapped students carries with it the same concerns that were expressed about such efforts at the secondary level. As for physically handicapped students, most of the expenditures we recorded appear so basic (wheelchairs, readers, etc.) that it is hard to believe that needy students would not receive these services under other federal and state programs. It is

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[5] Per-pupil refers to total enrollment, not the number of handicapped students.

Table 1.3

Percentage of School Districts Where "All" or "Most" Handicapped Students Received Selected Services, by Level of Per-Pupil Perkins Act Funds, Handicapped Set-Aside, 1986-87

	Level of Perkins Act Handicapped Set-Aside Funds in District			
Selected Services	None	Low	High	Total
Assessments	72.9	85.9	81.9	82.6
Modified curriculum	66.0	67.0	74.0	69.9
Adapted equipment	32.8	18.0	28.3	24.2
Modified facilities	9.7	16.8	41.3	26.6
Guidance and counseling	78.4	89.1	89.2	87.9
Transition guidance	81.5	75.0	84.7	80.0

SOURCE: See table 1.2.

NOTE: Per-pupil refers to total enrollment in district, grades 9 through 12.

possible, however, that the services would not be provided by the institution, and so the students would not attend.

PROVIDING SERVICES FOR ADULTS UNDER THE PERKINS ACT

Because most of the adult set-aside funds appear to be used for the general support of adult vocational education in school districts, area schools, and community colleges, we cannot really judge the appropriateness of federally supported services. To the extent that the Act expressed a preference for the retraining of adult workers, however, we saw few instances of such programs (or any other specific programs) under the set-aside. In the few cases for which funds were attributed to specific activities, they were sometimes used for short-term training of persons with limited skills. Overall, however, the adult set-aside appeared to be general aid to states and localities. Because the funds provided basic operating support, the opportunities to use federal funds in lieu of state and local funds were broad.

SERVICES FOR PARTICIPANTS IN PROGRAMS THAT PROMOTE SEX EQUITY

Do the Funds Go to Places That Have a Need for Services?

Not much is known about the extent to which sex equity in vocational enrollment or placement differs across sectors or types of institutions. What we have learned through the local survey is that a small number of school districts received grants, and median grants were extremely small.

- Only 7.2 percent of school districts spent funds in 1987-87. Despite this small number of awards, however, the median expenditure was only $3,600 and three quarters of awards were $9,369 or less. We estimate awards at $1.30 per student in grades 9 through 12.
- School districts with grants tend to be urban, but to have somewhat lower poverty rates than districts without funds.
- Area vocational districts receive funds at somewhat higher rates (29.4 percent). The median award was $8,120 and the 75th-percentile grant was $21,721. We estimate grants at $5.71 per student.
- Almost all eligible recipients that apply receive funds--at least 84 percent.

In some states included in the case studies, state officials reported difficulty in attracting sufficient proposals. At the postsecondary level, expenditures were at about the same rate and level as in area school districts. Grant sizes were small for all types of eligible recipients, far too small to purchase any sizable amount of staff time. Overall, far more postsecondary institutions receive grants than secondary school districts and area vocational districts combined (30.4 percent as opposed to 12.7 percent).

Are the Services to Achieve Sex Equity Appropriate?

Secondary Level

The tiny resources under this set-aside have been spread across a wide number of activities. Most of the activities in school districts and area vocational districts are aimed at training teachers about sex equity issues and at counseling and recruiting girls to nontraditional high school programs, although sometimes the activities are aimed at boys as well. There is little doubt that sex segregation in vocational education remains, despite efforts to promote nontraditional enrollments. In fact, NAVE findings presented below show that, over the past two decades, sex segregation in vocational enrollments has changed little. Most traditional patterns of enrollment persist.[6]

One important finding about sex segregation, reported in depth in the NAVE report on secondary education, is that girls who enroll and complete nontraditional high school programs are unlikely to find work in the fields for which they receive training. This finding has implications for services, because it suggests that recruitment is only the beginning. Programs need to incorporate guidance and job placement services that can overcome what appears to be a bias against hiring women in nontraditional fields. At present, almost none of the Perkins Act funds in any of the set-asides are supporting job placement activities.

Postsecondary Level

One difference at the postsecondary level was that sex equity set-aside funds were sometimes combined with funds from the set-aside for single parents and homemakers, so that the total awards were somewhat larger and the target group narrower. The services were similar to those at the secondary level, although in-service education was less important and support of staff salaries more prominent. According to case studies, a substantial number of Perkins Act-supported projects involved counseling, probably because when the target group is homemakers who are returning to the labor force, counseling, assertiveness training, and various other efforts aimed at building self esteem are important.

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[6] John Tuma, et al., *Enrollment Trends in Vocational and Academic Education in American Public High Schools 1969 to 1987*, NAVE Contractor Report, Chapter V (Berkeley, CA: MPR Associates, April 1988).

Are the Services to Achieve Sex Equity Additive?

Most of the activities supported under the set-aside appear to be additional to those that districts and institutions would undertake on their own, particularly at the secondary level. We found that 77 percent of the school districts and area vocational school districts that spent funds under the sex equity set-aside in 1986-87 indicated that they added or expanded activities aimed at promoting sex equity over the past five years (see table 1.4). In contrast, only 29.6 percent of those districts not spending federal funds had added or expanded such activities.

The additive nature of the funding is also supported by case study findings. First, the "one shot" nature of the activities supported under the set-asides (workshops, brochures, etc.) suggests that they are provided because support is available. In addition, however, local administrators indicated that most of the projects are supported entirely with the small amount of federal funds, and that without federal support they would not undertake such activities. Some administrators deprecated their districts' effort, suggesting that even though they had received federal support they did not see the point of promoting greater sex equity in vocational education.

The findings for the sex equity set-aside point up the problems that occur when several conditions are all present: federal resources are required to be additional, there is little local support for federal intent, and the grants are extremely small. The end product, when truly additive, is likely to be a one-time, often peripheral activity. Furthermore, after observing these limited activities over time, practitioners may discount the importance of all sex equity efforts as well as the goal. After years of witnessing such small-scale efforts (with likely small-scale effects) some of the local administrators interviewed in this study are, not

Table 1.4

Percentage of School Districts and Separate Area Vocational School Districts that Did or Did Not Add or Expand Activities to Promote Sex Equity 1982-87, By Receipt of Sex Equity Set-Aside Funds, 1986-87

	Sex Equity Set-Aside Funds	
Type of District	Yes	No
School districts (n=468)		
Added or expanded activities	77.0	29.6
Did not add or expand activities	23.0	70.4
Area vocational districts (n=175)		
Increased activities	77.1	48.7
Did not add or expand activities	22.9	51.3

SOURCE: See table 1.2.

surprisingly, cynical about efforts to achieve sex equity. The findings do, however, point up the need to rethink the mix of services and the level of service.

SERVICES FOR SINGLE PARENTS AND HOMEMAKERS

Do the Funds Go to Places With a Need for Services?

At the secondary level, most funds appear to flow to a small number of school districts and a larger number of area vocational districts.

- Only 5.4 percent of school districts received awards under the single parent set-aside. The median award was $8,000 and three quarters of expenditures were $20,000 or less. Almost no proposals were rejected.
- School districts with funds had significantly lower youth poverty rates than districts without funds.
- Area vocational districts were more likely to receive grants (31 percent). The median award was $32,696 and the 75th-percentile award was $43,993. A small number of proposals were rejected (16.5 percent).

From case studies it appears that most of the funds in secondary schools are used in programs for teenage parents. At the postsecondary level, grants are about the same size as in area districts. From case studies we have learned that, in a number of postsecondary sites, the funds support a portion of the costs of centers for displaced homemakers. Overall, far more postsecondary institutions received awards than the combined number of regular and area vocational school districts (46.9 percent as opposed to 11.8 percent).

Are the Services for Single Parents and Homemakers Appropriate?

Secondary Level

Most of the Perkins Act resources are used to support services in programs for teenage parents. Historically, programs for pregnant and parenting teens tended to lack vocational offerings, which were often limited to typing and shorthand. In part, the limited offerings were a function of operating the programs in settings apart from regular schools.[7] We do not know the extent to which teenage parent programs supported under the single parent set-aside were located in separate settings or facilities. Research conducted at the beginning of the decade found that some of the programs in separate settings were inferior to the education students would have received in regular high schools. Physical facilities tended to be old and run down. Instructional hours were shorter and the mix of course offerings more limited than in regular schools. Equipment and texts were in short supply.

It is encouraging to find that programs supported with Perkins Act funds appear to be offering some vocational education to teenage parents, but most of the federal funds are used for counseling and other ancillary services. Only a subset of districts uses federal funds to support vocational instruction. Although the median grant to a school district is probably too small to pay for the costs of instructional staff, median grants to area vocational facilities tend to be considerably larger.

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[7] This discussion draws heavily on Gail Zellman, *The Response of the Schools to Teenage Pregnancy and Parenthood* (Los Angeles, CA: The Rand Corporation, 1981).

Postsecondary Level

One of the most notable case study findings was the similar use of set-aside funds across different types of institutions. There appears to be consensus about the appropriate set of services in a program for women returning to the labor market: recruitment, counseling, courses or group sessions aimed at building assertiveness and self-esteem, referral to child care and other social services, referral for student aid, and referral to training. Many of the programs are operated from centers for displaced homemakers located on or near the campuses of postsecondary institutions. In most cases the intervention is either prior to enrollment in regular offerings of the institution or concomitant with the start of training. Field staff noted, however, that the vocational training itself is likely to be short-term and in traditionally female fields. Although this training may reflect the economic reality--these women need jobs quickly, and jobs are most plentiful in traditionally female fields--it would be appropriate for federally funded projects to demonstrate that other choices are possible.

Are the Services for Single Parents and Homemakers Additive?

Because the lack of adequate vocational instruction has been a serious problem in programs for teenage parents, it is encouraging to see secondary expenditures associated with these programs. Counseling is usually a major function of these programs, because teenage parents face a wide range of psychological and economic difficulties. It is simply impossible to know how much of the counseling supported through the Perkins Act is additional. A substantial portion of federal funds is probably used for assessments to which the teenage parents (as disadvantaged students) are entitled under Section 204(c). The second most common use is to pay for staff for separate vocational classes which, given the history of programs for teenage parents, may be a new service.

Despite limited offerings, programs studied in the early 1980s were generally more expensive than regular offerings because of smaller class size. Many were also dependent on sources of support outside the district for their continued operation. Sources included state or federal special education funds, state or federal categorical funds for teen pregnancy and parenting programs, and foundation support. In some cases, sufficient outside support was generated that the school districts in which programs were located actually spent less of their own funds per pupil for students in these programs than for other students.

The Perkins Act is designed to provide additional services to special populations and to increase the access of special populations to high quality vocational education. If it is the case that single parent funds are used to support a portion of the ongoing costs of programs with the characteristics described above, it may be the case that the Act is doing little to help improve vocational opportunities for this population. Given the weak nonsupplanting provisions in the Perkins Act, and the fact that the districts are using the single parent rather than the disadvantaged set-aside, the funds may not even be purchasing more services than would be available without them. Clearly, this issue warrants further attention.

At the postsecondary level, it appears that Perkins Act funds support a share of an overall set of services in special programs for women returning to the work force. Most commonly the service is counseling, including referral to various sources of economic assistance. To the extent that direct economic assistance is provided (e.g., tuition waivers), it appears to be in the form of a stopgap--before other sources are available and, hence, additive. In general, these programs appear to add to regular institutional offerings and to rely on a variety of state and federal programs to support their costs. In several sites, school officials and program personnel indicated that without the support package, of which Perkins Act funds are a part, these programs probably would not exist. Again, the institution views them as "add ons"; so although they are additional, they are also marginal and their survival depends on outside funding. Perkins Act funds may or may not be the impetus for their creation, depending on the site, but the funds support a piece of these additional programs.

SERVICES FOR PERSONS IN CORRECTIONAL INSTITUTIONS

Because questions about the uses of the corrections set-aside were asked only at the state level, we have less complete information on the uses of these funds. Like adult set-aside funds, however, the corrections set-aside appears to pay for the general operating support of educational offerings. In one case study state, funds were earmarked for replacement of extremely old vocational equipment. To the extent that funds are not allocated for specific activities, however, the opportunities for supplanting are substantial. Of course, given the tiny amount of money, substitutions would have little consequence for state budgets.

SERVICES SUPPORTED UNDER TITLE II(B)--PROGRAM IMPROVEMENT AND EXPANSION

Do Funds Flow to Places With Program Improvement Needs?

State Level

A substantial share of program improvement funds is retained for statewide activities. In states where case studies were conducted, the amounts of program improvement funds retained ranged from less than 10 percent to 40 percent. The funds retained for statewide projects reduced the share of funds for program improvement spent locally in 1986-87 to approximately 31.7 percent of the Basic Grant compared to the 43 percent in the federal legislation. For our data it appears that small amounts of adult, sex equity, and single parent funds are also retained for statewide projects. As specified in law, little or no handicapped or disadvantaged set-aside funds appear to be retained. Most statewide projects involve assistance to secondary vocational education, although slightly over one half of the program improvement funds spent by local recipients were spent by postsecondary institutions.

Local Level

A little over a quarter of school districts spent funds as did about half of area school districts. Median expenditures in area districts were 2.5 times the size of those in school districts. Well over half of postsecondary institutions spent funds, and median expenditures in postsecondary institutions were twice the size of those in area school districts.

- In the 26 percent of school districts with awards, the median expenditure was $9,887 and 75 percent of expenditures were $21,549 or less. We estimate the average grant at $14.09 per student in grades 9 through 12. Larger districts were significantly more likely than small districts to spend funds.
- More than half of area school districts (51 percent) received awards with median expenditures of $25,000 and 75th-percentile awards of $58,259. We estimate that the average per-pupil expenditure was $27.32 in districts with awards.
- Postsecondary institutions were the most likely of the three types of eligible recipients to spend program improvement funds with 58.7 percent spending funds (as opposed to 32 percent of all secondary districts combined).
- Postsecondary median awards were $50,000 and 75th-percentile awards were $85,000. We estimate per-pupil (head count) awards at $21.77 for institutions with awards.
- Of funds reportedly spent by local recipients, postsecondary institutions spent 52 percent of program improvement funds.

The large median awards to area vocational school districts and postsecondary institutions raise questions about the role of federal support in programmatic upgrading. The institutions with substantial Perkins Act support are generally considered to have the better vocational programs overall. According to findings from the case studies, postsecondary institutions in particular tend to change programs, update curricula, and recruit new populations regularly. If, as is widely held, the poorest vocational programs are located in comprehensive high schools, those are not the locations most likely to obtain program improvement funds. Clearly, policymakers need to determine where improvement and innovation are most necessary and how to ensure that federal funds are directed to those places.

Program improvement funds were distributed equally among secondary school districts with high, low, and medium rates of poverty, but differently among districts that did or did not receive handicapped and disadvantaged set-aside grants. Over three times as many program improvement grants were awarded to secondary districts that received handicapped or disadvantaged funds than to districts that did not receive handicapped or disadvantaged funds. But the program improvement grants to districts that did not receive a handicapped or disadvantaged grant were, on average, somewhat larger than the program improvement grants to districts that received a handicapped or disadvantaged grant, and, in addition, were somewhat more likely to be awarded to low poverty districts.

Are the Services Appropriate?

State Level

As indicated above, virtually all state-level activities supported through the Perkins Act are concerned with *secondary* vocational education. State officials are involved in specifying and validating the occupational learning of secondary students, both to increase local program accountability and to demonstrate that students have the skills to get jobs. A small subset of states appears to be using federal resources to develop curricula aimed at general vocational skills or at curriculum and model program development for vocational-academic integration. All the states visited in the case studies belong to interstate consortia supported with federal funds.

State-level curriculum development has been taking place at least since the mid-1970s and is common in almost all the states visited. Because it appears to consume substantial amounts of the Title II(B) funds retained at the state level, it is important to learn more about the extent, content, and uses of the funds. In the case study states there was little systematic information available on the extent to which state-developed curricula have been implemented in localities. Only a limited number of the local communities we visited were using state-developed materials, and several were embarking on their own curriculum development as well. Given the likely uniformity of secondary vocational offerings across states (i.e., assuming that training for automobile mechanics or for secretarial work need not vary a great deal from place to place), the opportunities for greater across-state curriculum development should be explored.

A subset of the states we visited is engaged in a variety of innovations using federal funds. In one state, vocational education has taken the lead in shaping courses aimed at teaching what state officials called general vocational skills, skills that can be applied in a wide range of occupations. In several states, vocational educators have embarked on efforts to better integrate the secondary curriculum through coordination of academic and vocational studies. In another instance, Perkins Act funds have been combined with other state and federal resources to promote unified education, training, and social services for welfare recipients and other disadvantaged adults. In all these cases, state vocational officials have taken the lead in promoting unique activities that provide leadership not only within their states but for vocational education nationally.

Secondary and Postsecondary Levels

The main use of Title II(B) funds at the local level was to purchase equipment. Eighty-six percent of secondary school districts, 79 percent of area school districts, and 80 percent of postsecondary institutions with federal funds spent at least some of their funds for equipment. Reasons cited by case study respondents for using federal funds for equipment include having used federal funds for this purpose for many years, the difficulty of obtaining local funds for equipment purchases, and the likelihood that equipment purchases will stand up to audits as a legitimate use of program improvement funds. Another contributing factor may be the federal regulation that *all* expenditures of federal funds for equipment meet the requirement that Title II(B) expenditures must be for the "innovation, improvement, or expansion of programs." Given the small size of Perkins Act awards, it is likely that grants hardly cover the costs of equipment replacement, let alone equipment updating.

But to what extent are equipment purchases a means to improve programs? As respondents in the case studies noted, there are two axioms about the relationship between equipment and vocational education: acquisition of equipment is vital to the existence of vocational education, and vocational institutions always need new equipment. In other words, acquiring equipment is important to the maintenance of existing programs as well as to expansion and change.

Districts and postsecondary institutions are always engaged in some level of change and program innovation, the extent dependent on local leadership and economic conditions. Districts and institutions recruit new populations, develop curricula or adopt curricula developed elsewhere, establish "articulation agreements" across schools or educational sectors, establish or adopt model programs (Principles of Technology is currently popular), start new offerings in response to changes in the labor market, and (less often) cancel or modify old ones. In short, there is always enough "innovation" going on to absorb the rather small sums available from the Perkins Act. Yet Perkins Act funds are used, at very high rates, for equipment purchases that do not appear to provide a catalyst for change and in many instances appear unrelated to changes taking place in the same locale.[8] Further, few equipment purchases were associated with services for special populations.

At best, an equipment purchase might be tied to the planned introduction of a particular program or upgrading of the curriculum in a subject area. In such cases, officials have come to rely on the federal funds to support a portion of the costs associated with the change--the particular portion being for the needed equipment. At worst, however, federal funds are simply spread among schools or programs every year or doled out to a different program or school or district each year--the idea being equity of equipment support. In these cases, there is no claim to particular innovation. District officials simply view the resources as "federal equipment money" and calculate it into their budgets. When funds are spread among many schools or programs in a single eligible recipient, the sub-awards are often too small to make any difference.

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[8] The percentages of funds spent on equipment in our survey are particularly high when one considers that two of the largest states in the survey specifically prohibited secondary-level institutions from spending Title II(B) funds for equipment.

Title II(B) funds have proven useful to localities. We were told repeatedly that administrators rely on the funds from year to year, that they like the fact that the funds can be spent for just about any purpose or priority, that the availability of federal resources for equipment purchases allows them to bypass school boards that are loath to appropriate funds for equipment, and that administrators use funds as incentives--awarding them to teachers or programs they consider successful. In short, the funds amount to reliable "soft" money, calculated into local planning.

Are the Improvement Funds Additive?

State Level

Federal funds retained for statewide projects appear to be additive in the sense that, without them, it is unlikely that state vocational education officials would have discretionary funds for statewide activities. Although most states have specific state funds for vocational education, those resources are likely to be increments to formula-based state aid or are earmarked for certain categorical activities, such as equipment purchases or in-service education. State officials have little control over their use. In state after state we were told that, without federal funds, curriculum development activities and interstate consortia would not exist, in part because state categorical funding or other state aid must go directly to localities. In some states, relations between vocational officials and chief state school officers are poor or competitive, and federal funds are the only source of support for program development activities of state vocational administrators.

Secondary and Postsecondary Levels

It is possible to make some general observations but impossible to reach definitive conclusions about the additivity of equipment or other purchases. As noted earlier, districts and institutions have spent funds in this manner for many years and have come to rely on this source of aid. The aid is calculated into the budgets of districts and institutions that receive support. If administrators know federal funds will be available for equipment, they can use state and local resources for other purposes and, in that sense, federal funds are hardly additive. If federal aid were eliminated tomorrow, many states and localities would probably have to spend resources on equipment that are currently devoted to other outlays, or would have to generate new resources. States included in the case studies that prohibited the use of program improvement funds for equipment had earmarked state funds for this purpose.

According to the case studies, the main use of program improvement funds appears to be as much associated with the regular operating costs of vocational programs as with programmatic change. As the historical pattern is now well established, federal funds may well substitute for nonfederal funds that would otherwise be spent for ongoing needs. Case studies revealed that the "match" for equipment purchases was rarely spent for equipment. Usually, there was enough ongoing "change" or "expansion" to match federal funds, so federal resources have achieved little leveraging. Over time, "federal equipment money" has been a reliable and convenient source of ongoing programmatic support.

According to survey findings, there was a positive but not statistically significant relationship between receipt of program improvement funds and some types of innovation at the secondary level (see table 1.5). We compared school districts on amount of innovation observing, separately, those that spent program improvement funds, those that spent funds only under other parts of the Perkins Act, and those that spent no Perkins Act funds. We found that those that spent program improvement funds in 1986-87 were more likely than others to report that they had expanded work experience programs and developed curricula that integrated mathematics or science with vocational education over the past five years. But they were no more likely than those with other Perkins Act funds or no Perkins Act funds to have added general vocational courses, responded to advances in technology, established articulation agreements with postsecondary institutions, or developed integrated secondary-postsecondary

Table 1.5

Percentage of School Districts that Did or Did Not Add or
Expand Various Vocational Improvements 1982-87, by Receipt
of Perkins Act Funds, 1986-87

	Perkins Act Funds		
Improvements	Program Improvement	Other Only	None
General or transferrable skills courses			
Added	37.3	40.8	24.1
Not added	62.7	59.2	75.9
Responses to advances in technology			
Added	72.1	69.2	50.2
Not added	27.9	30.8	49.8
Articulation agreements with postsecondary institutions			
Added	33.8	33.9	9.3
Not added	66.2	66.1	90.7
Integrated curriculum with postsecondary institutions			
Added	22.6	18.0	9.6
Not added	77.4	82.0	90.4
Work experience programs			
Added	34.4	14.0	12.8
Not added	65.6	86.0	87.2
Integrated math/science curriculum with vocational education			
Added	33.3	25.3	11.5
Not added	66.7	74.7	88.5

SOURCE: See table 1.2.

curricula. It should be noted, however, that this analysis compares grants received in one year with change over a five year period.

Repeating the same analysis at the postsecondary level, we found a somewhat greater likelihood for those institutions with program improvement funds to have responded to advances in technology, established articulation agreements, or integrated math or science into vocational education (see table 1.6). It should be remembered, however, that both the sizes and the numbers of awards were much larger at the postsecondary level.

CONCLUSION

We conclude that, in its current form, the Perkins Act is a weak mechanism to accomplish its goals--expanded opportunities for special populations in vocational education and program improvement. As shown in the next two chapters on the status of secondary and postsecondary vocational education, the goals of the Perkins Act are directed to significant problems in vocational education. The weaknesses lie in the legislative and regulatory provisions to achieve those goals.

The major difficulty with the Act as it is currently written is that it lacks sufficient financial incentives and direction to bring about the improvements it seeks. Expenditures under the set-asides for special populations tend to support ancillary services or remedial academic instruction for individual students rather than upgrading the access of students to high-quality vocational programs. Over time, program improvement funds have become a fairly reliable source of equipment support for many school districts and postsecondary institutions, calculated into yearly budgets. Not surprisingly, recipients of funds were not significantly more likely than nonrecipients to engage in a range of program innovations.

The second major weakness of the Act is that its targeting provisions are largely ineffective. NAVE finds evidence of some targeting of resources to secondary school districts with higher rates of poverty. But the amount of targeting has not increased as a result of the introduction of the intrastate formula or other provisions in the Perkins Act. The practice in many states of determining the amounts of Perkins Act funds to be allocated to secondary and

Table 1.6

Percentage of Postsecondary Institutions That Did or Did Not Add or Expand Various Vocational Improvements 1982-87, by Receipt of Perkins Act Funds, 1986-87

	Perkins Act Funds		
Improvements	Program Improvement	Other Only	None
Integrated curriculum with secondary schools			
Added	33.6	22.5	7.3
Not added	66.4	77.5	92.7
General or transferrable skills courses			
Added	28.1	26.1	3.4
Not added	71.9	73.9	96.6
Articulation agreements with Secondary schools			
Added	61.4	42.3	50.1
Not added	38.6	57.7	49.9
Responses to advances in technology			
Added	90.7	73.6	74.8
Not added	9.3	26.4	25.2

SOURCE: See table 1.2.

postsecondary levels before applying the intrastate formula has produced wide variations in the per-pupil amounts of funding even under the handicapped and disadvantaged set-asides. As for within-district targeting, the Perkins Act relies on vague definitions of student eligibility, and states and localities have not developed more precise targeting policies of their own.

One reason for problems in the implementation of the Perkins Act is that little has been done through regulation or oversight to convert the Act's goals and provisions into effective guidelines for states and localities. The goal of expanding access to high-quality programs of vocational education for disadvantaged and other special populations of students has not been interpreted in the regulations. Ambiguities in the criteria for allocating funds and the definitions of target groups have not been resolved. Little technical assistance to states and localities on effective practices for serving target populations has been provided. No regulations have been written to implement the nonsupplanting provision in the legislation and ensure that federal funds are not used to support existing activities. Allowing all equipment expenditures to qualify as "improvement and expansion" further weakens the additivity of federal funds.

Also contributing to the lack of program reform are the small size of grants under the Perkins Act, and supplementary service, excess cost, and matching provisions. The small size of grants is a particular problem for secondary school districts. Fear of audit exceptions under the various effort provisions creates incentives to spend funds on easily identified activities among all recipients, whether or not the activities contribute to improved access. These activities may be peripheral to instruction or simply expensive ongoing services.

Multiple set-asides in the legislation fragment resources even when total grant sizes may be adequate. Not only do they result in smaller grants, but they further constrain the choices available to teachers and administrators at the school level who are usually in the best position to identify student, program, and schoolwide improvement needs. State practices of creating separate competitions within set-asides, or of imposing additional rules beyond the federal criteria, may add new sub-categories to the Act.

Perhaps the greatest problem in current federal legislation is that it lacks explicit priorities for both program improvement and helping special populations. Those priorities would likely be different for the secondary and postsecondary levels. Instead, the legislation lists 25 eligible program improvement categories and a variety of (mostly support) services and remedial instruction for special populations. In truth, sufficient understanding of the extent and nature of the problems or of effective practices that would enable policymakers to narrow the priorities has also been lacking.

In the chapters that follow, and in the several supporting volumes of this final report, we present analyses and arguments designed to describe participation in and outcomes of vocational education, identify the problems, and describe what is currently known about effective practices. This information will allow us to recommend priorities for future legislation. The priorities help to define the federal role in vocational education and what is meant by program improvement.

CHAPTER 2

SECONDARY VOCATIONAL EDUCATION

SUMMARY OF FINDINGS

This section presents our major findings concerning participation in and the outcomes of secondary vocational education. The chapter has two parts: a summary of findings on secondary vocational education and a set of recommended federal policies on secondary vocational education. The summary of findings has four sections. First, we present an analysis of secondary academic and vocational enrollment patterns. Second, we examine the access of three population groups to high-quality vocational education: handicapped students, disadvantaged students, and women. Third, we assess vocational education as a provider of job skills. Fourth, we examine the potential of vocational education to contribute to academic skills development, a learning objective typically associated with the academic curriculum. The recommendations for federal policy include specific objectives for federal support and means for achieving them.

Who Participates in Secondary Vocational Education?

One of the striking characteristics of secondary vocational education is the breadth of student participation (see table 2.1). As one might expect, work-bound students (students who expected to complete their education at the end of high school) are the largest consumers of all three major types of vocational education: consumer and homemaking education, general vocational education, and occupationally specific vocational education.[9] Surprisingly, college-bound students also take substantial amounts of vocational education--not just introductory industrial arts and consumer and homemaking education, but occupationally specific vocational

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[9] General vocational education includes typing I, introductory industrial arts, work experience, and general skills courses. Occupationally specific vocational education includes vocational training in 11 subjects: agriculture, business support, business management, marketing and distribution, health, occupational home economics, technical and communications, construction, mechanics and repairers, precision production, and transportation. The last four subjects are trades and industry subjects.

Table 2.1

Average Course Enrollments in Vocational Educational by Postsecondary Plans, 1982 (Credits)

	Postsecondary Educational Plans					
	High School Graduate Only	Vocational/ Technical	Some College	College Graduate	Graduate/ Professional	All Students
Consumer and Homemaking Education	0.86	0.89	0.69	0.46	0.36	0.64
General Vocational Education	1.20	1.07	1.06	0.85	0.72	0.98
Occupationally Specific Vocational Education	4.00	3.85	2.80	1.86	1.48	2.76
All Vocational Education	6.06	5.81	4.55	3.17	2.56	4.38

SOURCE: John E. Tuma, et al., Course Enrollment Patterns, op. cit.

education. In fact, students planning to attend postsecondary vocational-technical training or college account for the vast majority of vocational credits, 26.5 and 47.9 percent of all vocational credits, respectively (see table 2.2). In contrast, work-bound students, despite their greater enrollments on average, account for only 25.2 percent of all vocational credits and only 26.4 percent of all occupationally specific vocational credits.

Table 2.2

Share of Vocational Coursework Taken By
High School Graduates with Different
Postsecondary Educational Plans

	High School Graduate Only	Vocational/ Technical	Some College	College Graduate	Graduate/ Professional
Consumer and Homemaking Education	24.4%	27.8%	20.2%	17.0%	10.9%
General Vocational Education	22.4	21.9	20.3	20.7	14.4
Occupationally Specific Vocational Education	26.4	27.9	19.0	16.0	10.4
All Vocational Education	25.2	26.5	19.4	17.2	11.3
Share of All Students	18.2	20.0	18.7	23.7	19.4

NOTE: All rows sum to 100 percent, except for rounding errors.

SOURCE: NAVE, derived from *Course Enrollment Patterns*, op. cit.

Despite a substantial increase in mathematics and science enrollments between the high school classes of 1982 and 1987, enrollments in vocational education for both classes substantially exceeded enrollments in *all* other subject areas, including English, the largest academic subject (see table 2.3). Vocational course work was particularly dominant during the

Average Course Enrollments in Major Subject Areas 1982 and 1987

	Grades 11 and 12		Grades 9 through 12			
	Noncollege Bound Graduates 1982[a]	College Bound Graduates 1982[a]	Noncollege Bound Graduates 1982[a]	College Bound Graduates 1982[a]	All Graduates 1982[b]	All Graduates 1987[b]
Vocational Education	3.77	2.04	5.82	3.24	4.38	4.21
Mathematics	0.56	1.26	2.18	3.16	2.62	3.07
Science	0.39	1.08	1.81	2.66	2.21	2.54
English	1.81	1.96	3.92	4.08	3.90	4.02
Social Studies	1.81	1.89	3.25	3.34	3.21	3.33
Fine Arts	0.64	0.72	1.38	1.51	1.43	1.40
Foreign Languages	0.13	0.56	0.46	1.58	1.09	1.45
Personal and Other	1.04	1.16	2.84	3.00	2.75	2.80
All Subjects	10.14	10.66	21.67	22.57	21.61	22.84

SOURCE:

a. Robert H. Meyer and Robin S. Horn, Beyond Academic Reform--Applied Learning of Mathematics, forthcoming NAVE technical report.

b. Course Enrollment Patterns, op.cit.

last two years of high school. Among noncollege-bound students in the class of 1982, for example, 11th and 12th grade enrollments in vocational education exceeded math enrollments by a factor of five. Similarly, college-bound students in the class of 1982 took almost twice as much vocational education as mathematics during the last two years of high school.

The large amount of vocational education taken by students with different educational and work goals presents two major challenges for secondary vocational education and federal policy. One challenge is adapting the secondary school vocational curriculum to provide a range of programs and courses offering different mixes of job-specific and transferable occupational skills to meet the needs of different students. The vocational curriculum may need to be broadened for the many students enrolled who plan to obtain further education, or who have not committed themselves to an occupational field, by placing greater emphasis on transferable skills. But if the curriculum becomes too general it may lose its value for work-bound (and other) student seeking the immediate skills needed to get good jobs. Arriving at a sound balance of offerings to meet the needs of these different groups of students appears to require major change in the vocational curriculum. Supporting this revision and rebuilding of the curriculum should be one objective of federal policy.

A second major challenge invited by the large amount of vocational education taken by both work-bound students and students planning further education is expanding vocational education's contribution to the academic education of students. Table 2.3 demonstrates the importance of this issue, particularly for work-bound students. The total amount of vocational education taken by these students in grades 11 and 12 (3.77 credits) is nearly as large as the total amount of course work they take in all academic subject areas (4.70 credits). In grades 11 and 12, college-bound students also take 2.04 credits of vocational education as well as 6.75 credits of academic courses. Given its sizable role, if vocational education could contribute to academic skills development, it would be an important new vehicle for preparing youth with marketable academic as well as occupational skills. Expanding its academic potential should be a major objective of federal policy.

The need to examine the contribution of vocational education to academic learning is underscored by changes in the enrollment of students in academic and vocational subjects over the past 14 years.[10] Two major trends stand out: a steady increase in the total credits earned by students in high school classes that graduated between 1975 and 1987, and a shift from growth in the number of vocational education courses taken by students to growth in mathematics, science, and foreign language courses.

- The total credits taken by high school graduates (in academic, vocational, and personal/other areas of the high school curriculum) increased steadily from 20.86 credits in the period 1975 to 1978 to 22.84 total credits in 1987, with the largest increase of 1.23 credits between 1982 and 1987.
- The average amount of vocational education taken by students generally increased up to 1982. Since then, average enrollments in all vocational education (consumer and home-making economics, general labor market preparation, and specific labor market preparation) have leveled off or declined slightly. In 1982, the average graduate took 4.38 credits of vocational education and, in 1987, 4.21 credits.
- Since 1982, the major increase in courses taken has been in academic subjects, with most of the increase occurring in mathematics, science, and foreign language courses. The average graduate took 1.37 credits more in academic subjects in the class of 1987 than the class of 1982.
- Within mathematics, credits in applied mathematics have increased faster than credits in traditional mathematics courses, and credits in general mathematics have declined. Enrollment in general math has declined 28 percent (from .43 credits in 1982 to .31 credits in 1987), enrollment in applied math has doubled (.13 credits to .25 credits), and credits in the traditional mathematics subjects have increased 18 percent (1.37 credits to 1.61 credits).
- The increase in academic credits between 1982 and 1987 was directly proportional to students' grade point averages. Students whose grades were "mostly A's" increased course-taking by 1.88 credits, "mostly B's" by 1.62 credits, "mostly C's" by 1.23 credits, and "below C" by .81 credits.
- The decline in total vocational credits was greatest for the highest achieving students. Students whose grades were "mostly A's" took .26 credits less vocational education in the class of 1987 than the

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[10] John E. Tuma, Antoinette G. Gifford, et al., *Course Enrollments in Secondary Vocational Education*, NAVE Contractor Report (Berkeley, CA: MPR Associates, April 1989).

class of 1982, "mostly B's" .30 credits less, "mostly C's" .21 credits less, and "below C" .06 credits less.

- The share of occupationally specific course work in the vocational curriculum has steadily increased from 57 percent of all courses in the classes of 1975 through 1978 to 65 percent for the class of 1987. This trend is the result of both growth in the average number of occupationally specific credits taken by students, and decline in the amount of general vocational and consumer and home-making education.

- The trends in occupationally specific course work were different, however, for students with high and low grade point averages. Students whose grades were "below C" took more occupationally specific vocational education in 1987 (3.31 credits) than in 1982 (3.08 credits), while students whose grades were "mostly C's" or above took less.

In short, all students in the class of 1987 took more academic credits but students with grades "below C" took more academic credits *and* more occupationally specific vocational education, while students with grades of "mostly C's" or above took more academic courses and less of both general and occupationally specific vocational education. A significant increase occurred in the number of students taking applied mathematics and a similar decrease in general mathematics.

Access of Special Populations to Vocational Education

Of particular concern to federal policy is the extent to which special populations participate in vocational education and the quality of the programs in which they enroll. Three populations examined by NAVE were handicapped students, disadvantaged students, and women. NAVE used high school transcripts to determine the participation of special populations in vocational education. Among disadvantaged students, we focused on the participation of academically disadvantaged students, students with grade point averages of less than 2.0. They were compared with academically advantaged students, students whose grade point averages were 3.0 or greater. Handicapped students in the data were students with individualized education plans (IEPs). The two main data sources were the High School

Transcript Study (HSTS) for the class of 1987 and the High School and Beyond Survey for the class of 1982.

To examine the participation of special populations of students in vocational education and the quality of the programs in which they were enrolled, we focused on a variety of different individual and school level descriptive measures, such as the proportion of occupationally specific to all vocational courses taken by students, the proportion of courses taken at area vocational schools compared to comprehensive high schools, the amount of vocational training for low skilled service occupations relative to other occupations, and the breadth and depth of advanced level vocational courses available to students. All of the variables used are generally considered to measure the quality of vocational education.

Enrollments in Vocational Education

Special Needs Students. Data from the HSTS show that both handicapped and academically disadvantaged students enrolled in public high schools take more vocational education than other students. Most of the vocational credits earned by handicapped students are in regular, as opposed to self-contained vocational classrooms.[11] This finding is encouraging given the objective of the Perkins Act and other federal legislation that handicapped students should be provided with access to vocational education in the "least restrictive environment."

- Handicapped students earn an average of 5.20 credits of vocational education compared to 4.02 credits for nonhandicapped students over four years of high school. These credits amount to 27 percent of the total credits taken by handicapped students compared to 18.3 percent of the total credits taken by non-handicapped students.

- Handicapped students take 81.7 percent of their vocational course work in regular, as opposed to self-contained, classrooms. In comparison, handicapped students take only 59.5 percent of their academic course work in regular classrooms.

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[11] The results in these sections are summarized from Becky Hayward, *Handicapped and Disadvantaged Students: Access to Quality Vocational Education*, Volume V, Final Report of the National Assessment of Vocational Education (Washington, DC: Department of Education, 1989).

- Academically disadvantaged students in the HSTS earned an average of 4.39 credits of vocational education in high school (or 23.6 percent of their 18.6 total credits). Advantaged students earned 3.01 credits in vocational education (or 12.1 percent of their of 24.87 total credits).

As heavy participants in vocational education, handicapped and disadvantaged students also take a higher percentage of their course work in area vocational centers than do other students. The proportion of courses taken in area vocational centers may be considered an indicator of the quality of programs in that these schools are generally thought to offer a wider range of higher quality occupationally specific courses than comprehensive high schools.

- Handicapped students earn nearly twice as much of their vocational credits in area vocational schools as nonhandicapped students (16.0 percent versus 8.8 percent).

- Academically disadvantaged students earn 12.5 percent of their vocational credits in area vocational schools and advantaged students, 5.8 percent.

The main reason that handicapped and disadvantaged students take a higher percentage of their vocational education at area vocational centers appears to be the larger amount of occupationally specific course work they take compared to other students. In general, the amount of vocational education taken by students at area vocational schools increases in proportion to the number of occupationally specific courses taken.

Another measure of the quality of students' vocational programs is the extent to which they have access to cooperative and other forms of work-based education courses. Studies of the employment experiences of handicapped students show that well-supervised employment experiences during high school, such as those provided through cooperative education, are important determinants of successful labor force entry and job retention. NAVE's finding is that, while neither handicapped or academically disadvantaged students spend much time in work-based courses, they spend more time in such courses than other students.

- Handicapped students earn 16.7 percent of their vocational credits in work-based courses (cooperative education, paid work experience, and work study) compared to 10 percent for other students.

- Disadvantaged students earn 10.1 percent of their vocational credits in work-based courses compared to 7.2 percent for advantaged students.

However, the quality of the work-based vocational education taken by handicapped students, as measured by the percentage of credits earned in cooperative education as opposed to paid work experience or work study, is lower than the quality of the work-based vocational education taken by other students.

- Fourteen percent of the credits of work-based vocational education earned by handicapped students are earned in cooperative education compared to 44 percent for other students.
- Thirty-seven percent of the credits of work-based vocational education earned by handicapped students are earned in cooperative education compared to 43 percent for advantaged students.

In contrast to the beliefs of many critics, neither handicapped nor academically disadvantaged students spend a great deal of time in training for jobs in low-level service occupations such as food service, cosmetology, building maintenance, and household services.[12] Only about 12.6 percent of handicapped students' vocational credits and 13.6 percent of disadvantaged students' vocational credits are earned in these fields. By contrast, nonhandicapped students earn 9.9 percent of credits in training for low skilled service occupations and academically advantaged students earn 9.6 percent.

The enrollment patterns of handicapped and disadvantaged students differ significantly by gender, however. Handicapped females, in particular, earn considerably fewer credits in occupationally specific courses than any other group of students, and they lack access to business and office occupations. Furthermore, handicapped female students are disproportionately enrolled in training for service occupations as well as nonoccupational vocational education, when compared to both nonhandicapped females and all male students.

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[12] These fields are mostly in the area of "occupational home economics services" in the course taxonomy developed by NAVE for secondary vocational education (*First Interim Report*, January 1988). The section of this chapter on "Vocational Education and Job Skills" discusses the proportion of all jobs held by graduates that are low skilled in comparison to medium or high skilled.

Nearly half of all vocational credits earned by handicapped females, and nearly half of the vocational credits of academically disadvantaged females, are in service occupation courses or consumer and home economics. In contrast, handicapped or academically disadvantaged males have enrollment patterns resembling those of nonhandicapped and academically advantaged males. This suggests that male special needs students have greater occupational opportunities in vocational education than do female special needs students.

Women. Between the classes of 1975 and 1987, traditional patterns of vocational enrollment by gender have largely persisted, although some changes have occurred.

- The total amount of vocational education taken by female students has steadily declined relative to male students since 1976. In 1976, female students earned .79 credits more vocational education than male students. By 1987, males earned .12 credits more.
- Between the classes of 1976 and 1987, female high school graduates consistently averaged about .8 credits less occupationally specific vocational education and .8 credits more general vocational and consumer and homemaking education than male students.
- The total amount of consumer and home economics course work taken by females fell from 1.03 credits for the class of 1982 to .86 credits for the class of 1987.
- The fields of business management, marketing and distribution, and technical and communications, which comprise 20 percent of all occupationally specific courses, enrolled relatively equal numbers of male and female students in the class of 1987.
- The greatest change in the ratio of male-to-female enrollments has occurred in business support. Ten years ago, females earned 5.7 times as many credits in business support as males; by the class of 1987, this figure had fallen to 2.8 times as many credits. An increase in female enrollment has also occurred in precision production.
- There has been little change in the past 15 years in the amount of sex segregation in the fields of agriculture, construction, mechanics and repairers, health, and occupational home economics. Together these fields constitute 48 percent of all specific labor market preparation.

Sex stereotyped enrollment patterns are more common among students with low socioeconomic status than among those with high socioeconomic status. The differences between males and females in credits earned in all major male and female dominated fields (agriculture, business support, trades and industry, health, and consumer and home economics) are greater among students with low socioeconomic status than those with high socioeconomic status.[13]

Access to High-Quality Vocational Education

Next we compared the quality of vocational education in *schools* with large concentrations of poor and low-achieving students to the quality of vocational programs in schools with large concentrations of advantaged students. Quality was defined in terms of the breadth and depth of courses offered. The measures of quality used were: whether students in the school had access to an area vocational center, whether the school offered cooperative education, the total number of vocational courses offered by the school, the total number of advanced occupationally specific courses at second level or above, and the number of program areas in which more than one or more than three courses were offered (business support and health, for example, are program areas).

We found major differences in the quality of vocational programs between schools with large and small concentrations of poor and academically disadvantaged students. Students in the most "disadvantaged" group of schools were 40 percent less likely than students in the most advantaged schools to have access to an area vocational school. Schools with the largest concentrations of disadvantaged students offered 40 percent fewer vocational courses than the most advantaged schools and about one half as many advanced vocational courses. There were also a third fewer program areas in the most disadvantaged schools compared with the most advantaged schools.

Although their choices are constrained, the graduates of schools with the highest concentrations of disadvantaged students take a much larger proportion of their high school course work in vocational education than do students in schools with the lowest concentrations of disadvantaged students. Students in the most disadvantaged schools take 12.06 credits in academic subjects and 6.49 credits in vocational education (or less than twice as many academic as vocational credits), compared to 16.26 credits in academic subjects and 3.26 credits in vocational subjects in the most advantaged schools (or nearly five times as many academic as vocational credits). This major difference indicates why vocational education quality (and its possible academic content) is critical to the quality of overall education for students in disadvantaged schools.

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[13] Larry Hotchkiss, *Access to Quality Vocational Education*, NAVE Contractor Report (Washington, DC: Decision Resources Corporation, December 1988).

These findings suggest that the greatest needs for program improvement are in schools with the highest concentrations of poor and academically disadvantaged students. Our basic finding is that students in the most disadvantaged schools take more vocational education yet it is of significantly lower quality than that offered in the most advantaged schools. The NAVE conclusion is that federal resources should be concentrated on improving the quality of programs in schools with high concentrations of disadvantaged students. Our findings suggest the existence of "school effects" on the quality of vocational education that, in addition to individual differences in course-taking, demonstrate the need for targeting federal resources on these schools.

Vocational Education and Job Specific Skills

Background

In this section we assess secondary vocational education as a provider of job specific skills.[14] The analysis examines the extent to which occupationally specific vocational education is used by students in subsequent employment. The analysis employs a new measure of use that incorporates whether the jobs subsequently obtained by students require more than minimal levels of skill. The analysis is confined to students who obtain no education beyond high school.[15] The group was selected because it enrolls in occupationally specific vocational education to a much greater degree than other students. It includes the vast majority of economically and academically disadvantaged students.

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[14] This section summarizes the findings contained in the following forthcoming NAVE technical reports: Robert H. Meyer and Robin S. Horn, *Do Students Use Their Training in Subsequent Employment?* and Robert H. Meyer, *Supply and Demand Revisited: An Analysis of the Skill Mismatch Between Vocationally Trained Workers and Jobs.*

One of the most common previous indicators for evaluating vocational education programs has been the training-related placement rate (TRPR). This indicator measures the share of workers employed in jobs that are classified as being "related" to their previous vocational training. Despite the fact that this indicator has been widely used by researchers and educators, it has several major deficiencies. First, it is insensitive to the number of vocational courses a student takes. Students who complete one vocational course are counted equally in computing usage rates with students who complete a large number of courses. As a result, the reported value for the utilization of vocational courses can be seriously distorted. Second, the TRP indicator ignores vocational courses taken outside of a student's primary vocational field or subject area. Since these vocational courses may be related to an individual's occupation even if the primary courses are not, (or vice versa), this omission has the effect of overstating placements rates for some workers and understating them for others. Finally, the TRP does not incorporate information pertaining to the actual level of skill required for an occupation. For example, a very low skill occupation may be nominally related to a vocational field yet require few skills of any kind. Workers in both kinds of jobs would be considered to have placements related to training, but the rates of training "use" are quite different.

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[15] This is a different subgroup than students who classified themselves as seeking no education beyond high school, a group we have classified as "work-bound" students elsewhere in this chapter. All data reported here are based on 1982 high school graduates included in the High School and Beyond data set. Thirty-eight percent of high school graduates from the class of 1982 obtained no further education beyond school.

NAVE has developed two new indicators that overcome these limitations: the course utilization rate and the skilled jobs course utilization rate. The *course utilization rate* (CUR) measures the share of all vocational *courses* taken by students that are related to jobs that they eventually obtain. The *skilled jobs course utilization rate* (skilled jobs CUR) measures the share of all vocational courses that are related to the jobs that the students obtain only when those jobs *require more than minimal skills*. The skilled jobs CUR, as will be demonstrated below, is a more informative performance indicator than either the CUR or the TRPR, if the incidence of low skill jobs is high. It is conceptually similar to the capital utilization rate used in macroeconomic analysis.

All analyses of the use of vocational training require some rule for determining the relatedness of training to job fields or occupations. Although it makes conceptual sense to allow occupations and training programs to be partially related, relatedness has generally been defined as an all or nothing outcome--you have a full match or none. This practice is also followed in our analysis. Following the research of Campbell and others[16] we measure the relatedness of vocational programs and occupations using a crosswalk developed by the National Occupational Information Coordination Committee (NOICC).[17]

One final piece of information is needed to decide which jobs to include in the skilled jobs CUR. To make this determination, we used the Specific Vocational Preparation (SVP) scale developed by the Department of Labor.[18,19] We classified occupations into three skill level groups using the following criteria: (1) *low job skill requirements*: the job requires three or less months of total training time; (2) *medium job skill requirements*: the job requires between three and six months of total training time; (3) *high job skill requirements*: the job requires more than six months of total training time. By definition, vocational courses that are related to occupations in the low skill category are not considered as matched or utilized courses in the skilled jobs CUR. Examples of occupations from the three skill groups are reported in table 2.4.

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[16] Paul B. Campbell, Karen, S. Basinger, Mary Beth Dauner, and Marie A. Parks, *Outcomes of Vocational Education for Women, Minorities, the Handicapped, and the Poor*, Columbus, OH: National Center for Research in Vocational Education, The Ohio State University, 1986.

[17] The data base used in our analysis, the High School and Beyond Sophomore Cohort Study, reports occupations held by individuals using 3 digit 1970 Census occupational codes. The linked HS&B transcript file reports high school courses in terms of 6 digit CSSC (Classification of Secondary School Courses) codes, which if truncated to 4 digits are identical to 4 digit CIP (Classification of Instructional Program) codes. The NOICC crosswalk indicates whether or not 4 digit CIP vocational programs and 3 digit Census occupations are related.

Findings

We estimate that, for men and women combined, about 38 percent of all occupationally specific vocational courses were used in skilled jobs during the fall of 1983 (see table 2.5). This was approximately 16 months after high school graduation for most of the students. For all jobs--not just skilled--the rate of course utilization is approximately 10 percentage points higher than the skilled job rate. The simple CUR thus overstates the true vocational course utilization.

Over time, the skilled job CUR increases while the simple CUR remains stable. Comparing fall 1983 and fall 1985, the simple CUR increased by only two percentage points but the skilled jobs CUR increased from 38 to 44 percent over this interval. Thus, the skilled

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[18] SVP is the amount of time required to learn the techniques, acquire the information, and develop the facility needed for average performance in a specific job-worker situation. This training may be acquired in a school, work, military, institutional, or vocational environment. It does not include orientation training required of a fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes vocational education (high school commercial or shop training, technical school, art school, and that part of college training which is organized around a specific vocational objective); apprenticeship training; inplant training; on-the-job training; and essential experience in other jobs. (U.S. Department of Labor, *Handbook for Analyzing Jobs*, 1972, p. 209.)

[19] The particular jobs held by individuals in the HS&B sample were not rated according to the SVP scale. However, we were able to assign SVP to values to all jobs since workers' occupations were reported and coded according to the 3 digit 1970 census occupational code. These SVP values were merged into our HS&B sample.

Table 2.4

Example Occupations by Skill Level

Low Skill Occupations

- Cashier (310)
- Stockhandlers (762)
- Cleaners and Charwoman (902)
- Busboys (911)
- Dishwashers (913)
- Food Counter and Fountain Workers (914)
- Waiters (915)
- Child Care, Private Household (980)

Medium Skill Occupations

- Sales Clerk, Nondurable Retail (283)
- Bookkeeper (305)
- File Clerks (325)
- Key Punch Operators (345)
- Telephone Operators (385)
- Typist (391)
- Garage Workers and Gas Station Attendants (623)
- Machine Operatives (690)
- Truck Drivers (715)
- Gardeners and Groundskeepers (755)
- Health Aides (922)

High Skill Occupations

- Draftsman (152)
- Photographer (191)
- Manager, Restaurant, Cafe, Bar (230)
- Sales Managers, Retail (231)
- Sales Representatives (281, 282)
- Bank Teller (301)
- Secretaries (370-372)
- Brick Masons and Stone Masons (410)
- Cabinet Makers (413)
- Carpenters (415)
- Baker (402)
- Electricians (430)
- Foremen (441)
- Machinists (461)
- Automobile Mechanics (473)
- Painters (510)
- Welders (680)
- Farmer: Owner/Tenant (801)
- Dental Assistant (921)
- Practical Nurses (926)

NOTE: Numbers in parentheses are 1970 Census occupational codes.

jobs CUR reflects the fact that, over time, students obtained jobs with greater skills, an issue that we will discuss later.

At both points in time, rates of skilled jobs course utilization were substantially higher for women than for men--46 versus 33 percent in 1983, and 53 versus 38 percent in 1985. The higher skilled jobs CUR for women was due, in large part, to their extensive enrollment in business education (56 percent of all their occupationally specific training) and the relatively high rate at which business graduates obtained skilled, business-related jobs: 53 percent in

Table 2.5

Rates of Vocational Course Utilization

	Women	Men	All
Skilled Jobs CUR (Course Utilization Rate in Skilled Jobs)			
Fall 1983	45.9%	32.6%	38.4%
Fall 1985	53.0	38.0	44.2
CUR (Course Utilization Rate)			
Fall 1983	61.1	39.0	48.7
Fall 1985	61.8	43.2	50.9
Sample Size			
Fall 1983	699	702	1,401
Fall 1985	667	699	1,366

SOURCE: *Do Students Use Their Training*, op.cit.

1983 and 65 percent in 1985 (see table 2.6). For women, rates of skilled course utilization were also relatively high in health (71 percent in 1983) and occupational home economics, the second largest vocational subject for women (51 percent in 1983). By 1985, however, the skilled jobs CUR in occupational home economics had declined to 32 percent.

In marketing, the third largest vocational subject for women, the skilled jobs CUR was quite low, 23 percent in 1983 and 38 percent in 1985. A major reason for these low rates is that a large share of marketing students initially work in low skilled jobs. This explanation is evident from comparing the simple and skilled jobs CURs for marketing. In 1983, the skilled jobs CUR was less than the simple CUR by over 40 percentage points.

Uniformly low rates of course utilization were found for women in the traditionally male trades and industry subjects, substantially less than 20 percent in most cases. These courses accounted for only 8 percent of all vocational enrollments among women. This finding means that the few women who completed nontraditional training failed to obtain related jobs.

Table 2.6

Rates of Vocational Course Utilization
by Subject Area, Women

Vocational Subject	Share of All Specific Coursework	Skilled Jobs CUR Fall 1983	Skilled Jobs CUR Fall 1985	CUR Fall 1983	CUR Fall 1985
Agriculture	2.97%	40.0%	26.9%	40.0%	26.9%
Business	55.96	52.6	65.4	62.7	70.7
Marketing	9.85	22.5	38.3	63.8	46.3
Health	3.40	70.7	78.8	73.5	81.0
Occupational Home Economics	18.06	51.4	31.5	79.6	64.4
Construction	0.42	0.0	0.0	0.0	0.0
Mechanics and Repairers	0.94	7.0	35.2	7.0	35.2
Precision Production	6.32	11.6	17.8	15.3	17.8
Transportation	0.03	0.0	--	0.0	--
Technical and Communications	2.05	6.1	31.6	6.1	31.6
All	100.00	45.9	53.0	61.1	61.8
Sample Size	699				

SOURCE: *Do Students Use Their Training*, op.cit.

Low to moderate rates of course utilization were observed for men in all vocational subject areas (see table 2.7). Skilled jobs CURs were less than 50 percent in all areas. In precision production, the largest vocational education area for men, the rate of skilled jobs course utilization was 27 percent in 1983 and 36 percent in 1985. In mechanics and repairers,

Table 2.7

Rates of Vocational Course Utilization
by Subject Area, Men

Vocational Subject	Share of All Specific Coursework	Skilled Jobs CUR		CUR	
		Fall 1983	Fall 1985	Fall 1983	Fall 1985
Agriculture	8.70%	45.5%	43.6%	47.0%	45.1%
Business	6.09	30.1	32.4	42.5	46.7
Marketing	4.75	35.5	20.9	45.2	27.5
Health	0.51	11.8	7.5	11.8	9.9
Occupational Home Economics	2.00	21.3	14.4	27.3	18.9
Construction	12.01	34.0	42.0	34.0	42.0
Mechanics and Repairers	26.25	38.7	45.5	46.4	51.6
Precision Production	37.43	27.1	36.0	34.5	41.8
Transportation	0.22	32.1	6.2	32.6	6.2
Technical and Communications	2.04	8.3	22.1	20.1	22.4
All	100.00	32.6	38.0	39.0	43.2
Sample Size	702				

SOURCE: *Do Students Use Their Training*, op.cit.

the second largest vocational area among men, the skilled jobs CURs was significantly higher, 39 percent in 1983 and 46 percent in 1985.

In comparing rates of skilled job course utilization among men and women, three points stand out. First, as previously mentioned, overall course utilization was much higher for women than men. Second, course utilization among women tended to be highest in traditionally female subject areas: business, health, and occupational home economics, and lowest in traditionally male subject areas. Conversely, course utilization among men tended to be lowest in the traditionally female subject areas. Third, skilled jobs course utilization increased over time for both men and women.

Although it would be unrealistic (and even undesirable) to expect percentage rates of course utilization to approach 100 percent,[20] the estimates reported in some fields are low enough to call into question the efficacy of occupationally specific training in some subject areas. Below we identify and examine the factors that may account for the underutilization of occupationally specific vocational training.

Factors that contribute to skill under utilization include:

- *Voluntary nonplacement*: students choose to work in occupations unrelated to their specific occupational training.
- *Frictional nonplacement*: students accept work in unrelated occupations because they are unable to find available training-related jobs.
- *Enrollment nonconcentration (diversification)*: if students take some coursework in unrelated vocational subjects, part of their training will always remain unutilized.
- *Aggregate supply and demand imbalance*: if the number of students trained in a particular field or subject area exceeds the number of job openings (at the market wage), some students will be denied access to training-related jobs.
- *Low-skill job incidence*: jobs that require only minimal occupational skills provide no opportunity for utilization of job-related occupational skills.

Before presenting estimates of the relative importance of these five factors, we examine the incidence of low, medium, and high skill jobs by occupational area.[21] The incidence of low skill jobs in fall 1983 was very high, particularly for young women (see table 2.8). Thirty-four percent of all jobs held by women 16 months out of high school were in low skill occupations, as compared with 22 percent for men. By the fall of 1985 (40 months out of high school), the incidence of low skill jobs had fallen dramatically for women, to 22 percent. The incidence of low skill jobs also declined for men, to 17 percent. For both men and women, the decline in low skill jobs was matched by growth in high skill jobs. In 1985, 38 percent of women and 44 percent of men worked in high skill occupations.

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[20] Rates approaching 100 percent would leave no room for students to explore career alternatives.

[21] Occupations were grouped into 11 different occupational areas, the first 10 of which were designed to exactly parallel the 10 vocational subject areas. For example, the first occupational area includes all occupations related to agricultural training. The 11th area includes all occupations that are not related to any of the 10 vocational subject areas. This classification scheme was developed to facilitate simple comparisons of the *supply* of students by vocational subject area and the *demand* for workers by occupational area. This strategy is

Table 2.8

The Incidence of Low, Medium, and High Skill Occupations

	Women		Men	
Skill Level	Fall 1983	Fall 1985	Fall 1983	Fall 1985
Low Skill	34.05%	22.31%	21.58%	16.63%
Medium Skill	39.78	39.39	43.69	38.99
High Skill	26.17	38.30	34.73	44.38
All	100.00	100.00	100.00	100.00
Sample Size	699	667	702	699

SOURCE: *Supply and Demand Revisited*, op.cit.

The distribution of medium and high skilled jobs differed significantly, however, between men and women (see tables 2.9 and 2.10). A single occupational area dominated the

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perfectly valid only if occupations are related to a single vocational subject area. In fact, the crosswalk that we use to relate vocational courses and occupations suggests that some occupations are related to vocational fields in more than one subject area. As discussed more fully in the NAVE technical report *Supply and Demand Revisited*, the simple procedure used here exaggerates the degree of supply and demand imbalance and, therefore, understates the level of voluntary and frictional nonplacement.

Table 2.9

The Distribution of Occupations by Occupational Area and Occupational Skill Level, Women

	Medium Skill		High Skill		Medium and High Skill	
Occupational Area	Fall 1983	Fall 1985	Fall 1983	Fall 1985	Fall 1983	Fall 1985
Agriculture	0.98%	0.81%	0.25%	0.25%	1.23%	1.06%
Business	9.83	13.32	14.02	21.97	23.85	35.29
Marketing	11.05	7.74	1.33	1.93	12.38	9.67
Health	3.18	2.89	1.69	2.29	4.87	5.18
Occupational Home Economics	6.49	5.82	5.28	4.38	11.77	10.20
Construction	0.63	0.21	0.00	0.00	0.63	0.21
Mechanics and Repairers	1.15	0.43	0.71	1.14	1.86	1.57
Precision Production	6.22	7.74	1.42	1.84	7.64	9.58
Technical and Communications	0.00	0.00	0.97	4.14	0.97	4.14
Non Vocational	0.23	0.43	0.50	0.38	0.73	0.81
All Medium and High Skill	39.78	39.39	26.17	38.30	65.95	77.69
All Low Skill					34.05	22.31
All Occupations					100.00	100.00
Sample Size	699	667	699	667	669	667

SOURCE: *Supply and Demand Revisited*, op.cit.

Table 2.10

The Distribution of Occupations by Occupational Area and Occupational Skill Level, Men

	Medium Skill		High Skill		Medium and High Skill	
Occupational Area	Fall 1983	Fall 1985	Fall 1983	Fall 1985	Fall 1983	Fall 1985
Agriculture	9.45%	7.10%	1.56%	2.60%	11.01%	9.70%
Business	5.26	5.96	5.23	8.50	10.49	14.46
Marketing	6.70	5.19	1.47	3.03	8.17	8.22
Health	0.23	0.23	0.26	0.27	0.49	0.50
Occupational Home Economics	1.04	1.64	5.69	2.60	6.73	4.24
Construction	6.86	5.89	3.22	5.86	10.08	11.75
Mechanics and Repairers	3.46	2.94	8.13	7.66	11.59	10.60
Precision Production	8.37	8.29	8.50	12.18	16.87	20.47
Technical and Communications	0.00	0.00	0.47	1.58	0.47	1.58
Non Vocational	2.32	1.75	0.19	0.10	2.51	1.85
All Medium and High Skill	43.69	38.99	34.73	44.38	78.42	83.37
All Low Skill					21.58	16.63
All Occupations					100.00	100.00
Sample Size	702	699	702	699	702	699

SOURCE: *Supply and Demand Revisited*, op.cit.

skilled labor market for women: business. In 1983, medium and high skill business occupations accounted for 24 percent of *all* jobs among the women. By 1985, this figure had risen to 35 percent. In fact, virtually all of the growth in skilled jobs for women between 1983 and 1985 was due to the growth in skilled business jobs. In both 1984 and 1985, skilled jobs in marketing and occupational home economics accounted for a total of 24 and 20 percent, respectively, of all jobs among women. Precision production, health, and technical and communications accounted for most of the remaining jobs.

In sharp contrast to women, jobs for men were spread more evenly across all occupational areas but were more concentrated in areas that accounted for few of the jobs held by women. Their occupational areas were: agriculture (11 percent of skilled jobs in 1983), construction (10 percent in 1983), mechanics and repairers (12 percent in 1983), and precision production (17 percent in 1983). Business and marketing were important job areas for men as well as women. They accounted for 10 and 8 percent, respectively, of all jobs among men in 1983.

In summary, among women, business dominated both the supply of occupationally specific training and the distribution of skilled jobs. Enrollments were generally low among women in nontraditional fields, fields that also accounted for the fewest jobs. Among men, enrollments tended to be highest in the following areas: agriculture, construction, mechanics and repairers, and precision production, areas that also accounted for a large share of jobs.

Despite this general consistency between the supply of workers and their job opportunities, close inspection of the supply in comparison to the employment tables suggests that, for men, there appear to have been more enrollments relative to employment opportunities in precision production and mechanics and repairers and fewer enrollments than jobs in business and marketing for both 1983 and 1985. For women, on the other hand, there appears to have been underemployment in health and possible overenrollment in business.[22]

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[22] The fact that the skilled jobs CUR was so high for women suggests that supply and demand imbalance could not have been as severe as suggested in tables 2.6 and 2.9. Research reported in the NAVE technical report *Supply and Demand Revisited* confirms that this is the

The enrollment-job match is discussed below in the context of our analysis of the factors that account for skill underutilization.

Table 2.11 reports estimates of the contribution of voluntary nonplacement, frictional nonplacement, enrollment nonconcentration, aggregate supply and demand imbalance, and low skill job incidence to the rate of skilled jobs course utilization. It was impossible to distinguish between the first two factors in our data so they are combined in a category we call "unrelated placements." Aggregate supply and demand imbalance and low skill job incidence have also been combined, but separate (additive) estimates of these two factors are also given. The estimates in table 2.11 indicate the multiplicative effects of the factors (or factor combinations on the degree of course underutilization). The product of one minus each factor (expressed as a rate, not in percentage terms) equals the reported skilled jobs CUR. Thus, data for each factor (or factor combinations) indicate the amount of course *underutilization* that would occur from that factor if all other factors were eliminated as sources of underutilization.

The results in table 2.11 are striking and perhaps surprising. They indicate that unrelated placement (voluntary and frictional nonplacement) was the major cause of course underutilization in 1983 and 1985, particularly among men. For men in 1983, the estimates indicate that even if enrollment nonconcentration, supply and demand imbalance, and low skill job incidence had been eliminated, course underutilization would still have been great. That is, the skilled jobs CUR would have been only slightly higher than the actual skilled jobs CUR at that time. Unrelated placements were also large for women, and rose over time.

But low skill job incidence, enrollment nonconcentration, and supply and demand imbalance also contributed to course underutilization, although the magnitude of these factors differed significantly for men and women and over time. For women, for example, low skill

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case. As mentioned in a previous footnote, the supply and demand estimates presented here exaggerate the degree of supply and demand imbalance and, therefore, understate the level of voluntary and frictional nonplacement.

Table 2.11

Factors That Account for Underutilization of Occupationally Specific Vocational Education

Factor	Women		Men	
	Fall 1983	Fall 1985	Fall 1983	Fall 1985
Voluntary and frictional nonplacements[a]	25.35%	31.53%	44.24%	37.89%
Enrollment nonconcentration[a]	13.78	14.29	22.88	22.07
Aggregate supply and demand imbalance, and low skill job incidence[a]	28.68	9.68	24.18	21.50
Aggregate supply and demand imbalance[b]	7..	3.27	10.60	11.41
Low skill job incidence[b]	21.16	6.41	13.58	10.09
Skilled jobs CUR	45.9	53.0	32.6	38.0

a/ The factor aggregates in rows 1, 2, and 3 interact in the determination of the skilled jobs CUR. The product of one minus each factor (+ 100) equals the skilled jobs CUR. See Source for further discussion.

b/ The aggregate factor in row 3 is the sum of the factors in rows 4 and 5.

SOURCE: *Supply and Demand Revisited*, op.cit.

jobs was a major reason for course underutilization in 1983 (21 percent), but a relatively modest reason by 1985 (6 percent). For men, enrollment nonconcentration (not taking a coherent group of courses) was a consistently large source of course underutilization (23 percent in 1983). For men and women, the least important source of course underutilization was aggregate match of training supply and available jobs.

Our diagnosis of the sources of course underutilization leads to the following conclusions. First, the fact that unrelated placements appear to have been so pervasive indicates that schools and employers need to do a much better job of placement, helping students get skilled, training-related jobs. If this proves to be an impossible task, then secondary vocational education will need to assess carefully the degree to which it should offer occupationally specific training, as opposed to more general occupational preparation.

Second, the fact that voluntary nonplacements appear to be so large indicates that many students enroll in occupationally specific training without a strong commitment to use their training in subsequent employment.[23] It is likely that these students are not yet ready to select a specific area of skill specialization. These students should have had additional vocational options from which to choose or postponed decisionmaking altogether. Ideally, students who are ready to select a specific area of skill specialization should have access to high quality occupationally specific training coupled with aggressive job placement assistance. Students who are not yet ready to specialize should have access to equally high quality broad occupational and general vocational education. The general point is that secondary vocational education needs to provide an array of curriculum options that reflect the diverse needs and interests of its clientele.

Third, schools need to take steps to accelerate the placement of high school youth into skill-demanding occupations. Although our analysis did not identify the factors that accounted for the initial high incidence of low skill jobs, particularly among women, we believe that students would be much more likely to obtain skill-demanding jobs if they had strong academic *and* occupational skills. Furthermore, it is likely that students would be stimulated to work harder and learn more if they faced the prospect of obtaining jobs that made full use of their academic and vocational skills right out of high school. If so, schools should approach the challenge of raising the skill levels of youth jobs by: (1) improving the academic and vocational rigor of vocational education; (2) ensuring that all high school students, even those ready to select an occupational specialty, develop strong academic skills; (3) working with employers to place adequately prepared students in skilled jobs; and (4) designing vocational programs to meet the needs of skill-demanding employers.

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[23] Since we estimate that voluntary and frictional nonplacements *combined* were a major source of course underutilization, it is likely that both factors were important. Alternatively, either one of the factors could have been responsible for most or all of the observed combined effect. For policy purposes, it is safe to assume that both factors were important.

Finally, since enrollment in vocational courses unrelated to each other (nonconcentration) was an important source of course underutilization, particularly for men, schools need to ensure that students enroll in sequences of occupationally specific training that are coherent. Students who are not yet ready to select a specific area of skill specialization may be better off enrolling in high quality broad and general vocational training than enrolling in a variety of unconnected occupationally specific courses. On the other hand, exposure to a variety of different occupational courses may help students develop or clarify their occupational interests and talents. Schools may need to experiment with alternative mechanisms for accomplishing career exploration.

In summary, our evidence indicates that in order for occupationally specific training to remain viable at the secondary level, much greater emphasis needs to be given to placing students in training-related jobs. The range of curriculum options in secondary vocational education needs to be expanded to accommodate both students who are and are not ready to select a specific area of occupational specialization. To do so, vocational education will need to develop new courses and programs that provide instruction in broad occupational skills that cut across a wide array of occupations. This objective may be particularly important for training in occupations that account for only modest shares of employment. This objective is also important because our findings on the underutilization of training are for students who obtained no further education beyond high school. As discussed in the section on enrollments the majority of secondary vocational education is taken by students who enroll in some form of postsecondary education. Finally, secondary vocational education must recognize that high school students need a firm grounding in both academic and occupational skills.

We recommend that in future analyses the skilled jobs course utilization rate or "skilled jobs CUR" be substituted for other measures of the relatedness of jobs to vocational training. First, the traditional training-related placement rate (TRPR) has several major weaknesses. As noted earlier, it treats all job outcomes alike, whether the student took one vocational course or a comprehensive program of studies. In addition, TRPR does not allow for the possibility that students make use of vocational skills learned in courses outside their major vocational area.

While a course utilization rate of any type would overcome these problems, there remains one additional and major concern. A simple course utilization measure fails to distinguish jobs that require sophisticated skills from jobs that require few or no skills. As a result, students may have high course utilization rates but be employed in jobs that have no opportunities to use the actual job skills they learned in school. Vocational administrators could decide to expand training in a field that presented few opportunities for skilled jobs because the simple course utilization rate in that field was high. Only the skilled jobs CUR can overcome this major weakness. In the next section, we examine the role of vocational education in the provision of mathematics skills.

The Contribution of Vocational Education to Mathematics Learning

NAVE has empirically tested the idea that high school vocational education contributes to the development of students' academic skills and assessed its potential for a greater contribution to the development of their academic skills.[24] The belief that vocational education can contribute to students' academic skills is based on the observation that the applied, often "hands-on" approach to instruction in vocational education stimulates student interest in school. As a result, it may provide opportunities to apply the abstract principles taught in mathematics, English, and other "core" subjects that contribute significantly to academic achievement. To the extent that individual learning styles differ, some students may learn academic skills more readily in an applied context. If they are effective, applied courses could complement or substitute for traditional academic courses as a means to learn basic academic skills.

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[24] This section draws on NAVE technical reports by Robert H. Meyer, *The Curricular Production Function: An Analysis of the Sources of Mathematics Proficiency*, December 1988; and Robin S. Horn and Robert H. Meyer, *Mathematics Learning for the NonCollege Bound Student: The Role of Vocational Education*, June 1988.

The analysis done by NAVE examines the effects of applied courses on students' achievement of mathematics skills using data from a nationally representative sample of students from the high school class of 1982. We focused on mathematics, rather than reading, communications, or other skills, for three reasons. First, increasing mathematics skills has been one of the top priorities of the recent academic reform movement. Second, labor market studies have shown that mathematics proficiency is one of the major determinants of productivity.[25] Third, the student transcript data used in our analyses describe mathematics courses and math-related courses in much greater detail than courses in other subjects, such as English. This detail permitted us to reliably isolate the specific courses that contribute to mathematics achievement.

The analysis examines the growth of mathematics proficiency among students in the last two years of high school, depending on the credits they earned in 19 different mathematics and math-related courses. These courses include: traditional mathematics courses (basic math, general math, computer math, pre-algebra, algebra I, geometry, algebra II, precalculus, and calculus), applied and specific vocational mathematics (e.g., applied math and business math), math-related vocational education (e.g., electronics, drafting, accounting, and agricultural science), and math-related science (chemistry and physics).[26] The 19 courses span a continuum that includes standard mathematics as well as a wide range of courses that may apply mathematical tools and concepts in other subjects.

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[25] John Bishop, "The Productivity Consequences of What is Learned in High School," Working paper no. 88-18, Center for Advanced Human Resource Studies, Cornell University, Ithaca, NY, December 1988.

[26] The model also includes course variables hypothesized to be unrelated to mathematics learning, such as nonmath-related vocational education, survey science, biology, English, social studies, fine arts, foreign languages, and personal and other courses.

The empirical analysis draws on data from the High School and Beyond Sophomore Study (HS&B), a unique data base consisting of 10,961 high school students surveyed as high school sophomores in 1980 and again as seniors in 1982. The data set includes high school transcripts and scores from a battery of six tests administered in both 1980 and 1982. The math test consists of 38 items: 18 use arithmetic skills, 12 use algebra skills, and 8 use geometry skills.[27] Given the availability of test scored data at two points in time, we were able to identify the contribution of high school courses to growth in mathematics proficiency, controlling for prior achievement. Thus, our estimates reflect the value added by high school courses.[28]

Despite these unique strengths of the HS&B survey, in some respects the data are not perfectly suited to evaluating the applied learning potential of vocational education. First, the mathematics test is dominated by items appropriate for measuring achievement in two particular courses: algebra I and geometry. Second, we have no way of knowing whether the math-related vocational or science courses taken by students were designed to promote the development of mathematics skills, even though they may possess this capacity intrinsically. Nevertheless, strong positive evidence that applied courses promote mathematics proficiency would establish the principle that mathematics can be learned outside of traditional mathematics courses. Separate analyses of college and noncollege-bound students were conducted to test the possibility that the effects of the "applied curriculum" are different for the two groups.

Enrollment levels in traditional mathematics, applied math, and math-related courses varied substantially between college and noncollege-bound graduates of the high school class of

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[27] Total testing time was 21 minutes for the mathematics test and 47 minutes for the five other tests combined.

[28] Estimates based on a single point in time are contaminated by the fact that prior achievement strongly affects course-taking. For example, an estimate of the effect of calculus on mathematics proficiency without controling for prior achievement would exaggerate its effectiveness because calculus students tend to be proficient in mathematics prior to taking the course.

1982, although, in general, noncollege-bound students were exposed to much less mathematics training--applied and nonapplied--than college-bound students (see table 2.12). Noncollege-bound students took much less traditional mathematics than college-bound students (2.03 versus 3.10 credits) and much less math-related science (0.17 versus 0.84 credits). On the other hand, noncollege-bound students took somewhat more math-related vocational eduction and applied math than college-bound students (1.19 versus 0.82 credits).

Enrollments in vocational education also differed significantly between college and noncollege-bound students, although both groups took more vocational education than mathematics. Vocational enrollments were especially large for noncollege-bound students, 5.69 credits on average. Math-related vocational courses accounted for approximately 18 percent of all vocational courses for all students.

The fact that noncollege-bound students enrolled in few math courses raises a concern about whether these students developed adequate mathematics skills while in high school. In fact, as indicated in table 2.13, college-bound students, on average, scored nearly twice as high as noncollege-bound students on the HS&B math test. In addition, the increase in math test scores among college-bound students from 1980 to 1982 was almost three times the increase obtained by noncollege-bound students (2.71 versus 1.08 points).

Given the large level of enrollments in vocational education, it is important to consider the extent to which vocational education could contribute to the mathematics development of high school students, particularly noncollege-bound students.

The evidence that mathematics skills can be learned outside of traditional mathematics courses is striking (see table 2.14).[29] For college-bound students, participation in a specific

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[29] The reported estimates indicated the average increment in mathematics proficiency associated with a one credit high school course. A coefficient estimate of 2.0, for example, corresponds to two correct items on the HS&B math test. The contribution of, for example, 4 credits is given by the reported estimates multiplied by 4. To eliminate the statistical distortions arising from individuals with perfect test scores--the so-called ceiling effect--the college-bound sample excludes individuals in the top 10 percent of the predicted sophomore math test distribution.

Table 2.12

Average Course Enrollments for Noncollege and College Bound High School Graduates, 1982

Courses	Noncollege Bound Students	College Bound Students
Vocational Education		
Math-Related Voc.	0.91	0.70
Non Math-Related	4.78	2.49
All Vocational Courses	5.69	3.19
Specific Voc. Math	0.13	0.05
Applied Math	0.16	0.07
All Applied Math	0.28	0.12
Mathematics		
Basic	0.14	0.05
General	0.63	0.28
Computer Math	0.02	0.04
Pre-Algebra	0.23	0.23
Algebra I	0.52	0.74
Geometry	0.26	0.71
Algebra II	0.17	0.59
Pre-Calculus	0.06	0.36
Calculus	0.01	0.09
All Math Courses	2.03	3.10
Non Math-Related Science		
Survey	0.83	0.70
Biology	0.82	1.12
Math-Related Science		
Chemistry	0.12	0.57
Physics	0.05	0.27
All Science Courses	1.81	2.66
Sample Size	3,759	6,347

SOURCE: *Beyond Academic Reform*, op. cit.

vocational math course (such as business math) increases mathematics proficiency by 1.70 points, which is equivalent to the contribution of algebra II. While the effects of applied mathematics and specific vocational math are substantially higher for the college-bound than

Table 2.13

Average Math Test Scores

Graduates	Noncollege Bound Graduates	College Bound
Sophomore Score	9.46 (8.10)	17.22 (9.35)
Senior Score	10.54 (8.61)	19.93 (10.02)
Change in Score	1.08 (5.92)	2.71 (5.72)
Sample Size	3,759	6,347

Standard deviations are reported in parenthesis.

SOURCE: *Beyond Academic Reform*, op. cit.

for the noncollege-bound group, the contributions of traditional math, chemistry, and physics, are nearly identical for both groups. The disparity in the effects of applied math courses for college and noncollege-bound students may mean that the applied math courses taken by noncollege-bound students are pitched at too elementary a level.

Math-related science courses (chemistry and physics) make surprisingly large contributions to math proficiency for both noncollege and college-bound students: on the order of half the effect of geometry, algebra II, or precalculus. These results provide the strongest evidence that mathematics can be learned through application.

The results for math-related vocational education also provide support for learning through application, although the effectiveness of these courses was limited to noncollege-bound youth. We estimate that five credits of math-related vocational education would increase the mathematics proficiency of noncollege-bound students by 1.10 points. An increase of this size would double the average two-year increase in math scores for the noncollege-

Table 2.14

Estimates of the Contribution of Traditional Math and Applied Mathematics Courses to Growth in Mathematics Proficiency

	Noncollege Bound Students	College Bound Students
Traditional Mathematics		
Basic Math	a	a
General Math	0.26	0.96
Pre Algebra	2.12**	1.45**
Algebra I	2.47**	2.29**
Geometry	2.07**	1.15**
Algebra II	1.96**	1.76**
Pre Calculus	1.53**	1.24**
Calculus	a	1.21
Math Applications		
Applied Math	0.63*	1.36**
Specific Vocational Math	0.03	1.70**
Chemistry/Physics	0.88**	0.80**
Math-Related Vocational Education	0.22*	-0.04
Sophomore Mathematics Test	0.93	1.00**
Sample Size	4,448	6,513

* Estimates statistically significant at the 0.05 level or higher.

** Estimates statistically significant at the 0.01 level or higher.

a. The number of participants was too small to generate statistically reliable estimates.

SOURCE: *Beyond Academic Reform*, op.cit.

bound group. Enrolling in five math-related vocational courses is not unrealistic given that noncollege-bound students in our sample took an average of 5.7 credits in vocational education.

Of course, since these courses comprise only 18 percent of the current vocational curriculum a major expansion of math-related vocational courses would be needed to enable most noncollege-bound youth to take a program rich in math-related vocational education. The lack of effects on math achievement of math-related vocational classes for college-bound youth suggests that math-related vocational courses, as structured in the early 1980s, provided fairly low level applications of mathematics.

In summary, our findings provide strong support for the idea of applied learning in mathematics. They also demonstrate, however, that major changes are needed to enable high school vocational education to contribute substantially to the development of students' mathematics skills. In fairness to vocational education, of course, it should be emphasized that the HS&B math test--with its emphasis on narrow mathematics skills and not, for example, problem solving abilities--undoubtedly understates the effect of math-related vocational education, math-related science, and applied math. NAVE concludes that an objective of federal policy in vocational education should be to encourage the expansion of academic learning in vocational education and the integration of academic and vocational curricula.

In NAVE field research, we visited a number of schools that are developing programs of "applied learning." The academic content of vocational education is being expanded and the content of both academic and vocational courses is being "brought into alignment."[30] Alignment means integrating the subject matter taught to students across courses and subject areas to make learning more efficient and meaningful. These state and locally initiated projects are testing the possibilities of expanding the academic learning of vocational students through applied learning. These innovators find that bridging the gap between academic and vocational teachers is one of their most important tasks, along with staff development and obtaining some extra resources. At present, few of these innovative efforts have been rigorously evaluated, so it is hard to reach any conclusions about their educational effects.

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[30] Nancy Adelman, *The Case for Integrating Academic and Vocational Education*, NAVE Contractor Report (Washington, DC: Policy Studies Associates, 1989).

RECOMMENDATIONS FOR FEDERAL POLICY ON SECONDARY VOCATIONAL EDUCATION

Based on the analysis of the status of secondary vocational education NAVE has identified six primary objectives for federal policy. The objectives address the major needs and opportunities for improving secondary vocational education. These six objectives are:

> *Revise and rebuild the high school vocational curriculum* to upgrade skill levels and provide different students with the mix of occupationally specific and transferable skills they need to get good jobs or to pursue further training and education at the postsecondary level.
>
> *Integrate high school academic and vocational curricula* so that: (a) students come to vocational programs well equipped with fundamental academic skills and that (b) vocational courses provide an applied context based on broad and specific job training that reinforces and enhances academic skills and motivates students to excel in both academic and vocational courses.
>
> *Accelerate the education of at-risk students* by providing them with the extra assistance they need to succeed in demanding and highly rewarding vocational courses.
>
> *Expand efforts to place students in good jobs* that make full use of their vocational and academic training.
>
> *Improve the linkages between secondary and postsecondary training* so that training is complementary for the large group of students who obtain training at both levels.
>
> *Raise the quality of vocational programs in schools with high concentrations of poor and low achieving students.*

Four of these goals are aimed at the general improvement of secondary vocational education in all schools, while two are specifically intended to increase the access of special populations to quality vocational education.

The plan for achieving these goals has two main objectives: to foster the programmatic improvement of vocational education at the school level and to target federal resources on raising the quality of programs in schools where quality is the lowest and disadvantaged students are concentrated. Federal funds would be directed to the school-level upgrading of vocational programs rather than to the ongoing operation of vocational programs. Services to individual students would be linked directly to enhancing their performance in upgraded programs. Efforts to advance the state-of-the-art in vocational education through the development and demonstration of model programs would be included, but the bulk of resources would be deployed to spread best practices, raise the general level of program quality, and raise the level of program quality in schools with large numbers of disadvantaged and handicapped students. In these two respects, improving programs and increasing the access of disadvantaged or handicapped students to quality programs, the proposed plan builds upon the major goals of the Perkins Act.

The plan for secondary vocational education recommended below is intended to stimulate reform in vocational education comparable to the general movement of the past decade to improve the quality of academic education. It is aimed directly at making vocational education part of that reform movement. The academic reform movement has focused on improving the academic achievement of all students and not just those preparing to enter college. Upgraded and invigorated vocational education could broaden and deepen what is meant by providing a quality education for all students, and especially for those students who plan to work after high school.

The plan described below cannot be accomplished without the full support of parents, teachers, state and local education officials, legislators, governors, employers, and others. As in the case of academic reform, the success of vocational reform will rest, ultimately, with the states and localities that set goals and carry out the reforms. Working with the states, however, the federal government can help to build commitment, set priorities, and provide resources that are needed to make change possible. As we have learned from our research on the implementation of federal policy, and the research of others, without a shared federal and state commitment to reform, federal resources are not likely to have much real impact. In this section we will outline the steps that need to be taken through federal policy to provide leadership and build commitment.

The specific components of the plan for federal policy at the secondary level are:

- *Performance Indicators.* Develop, collect, and disseminate indicators of the performance of vocational education to provide the basis for a comprehensive system of performance accountability.

- *State Reform Plans.* Plan and conduct activities to reform and improve key aspects of vocational education statewide through enhancing, for example, teacher education, teacher certification, the continuity between secondary and postsecondary programs, and the role of vocational training in economic development.

- *Local Improvement Grants.* Raise the quality of vocational education in schools where the needs for improvement are the greatest, through a targeted program of support to local schools managed by the states (using 70 percent of Basic Grant funds to secondary vocational education).

- *Local Demonstration Grants.* With the assistance of the federal office, develop demonstration and evaluation activities to test alternative approaches to vocational education and advance knowledge of best practices (using 10 percent of Basic Grant funds to secondary vocational education).

- *Experimental State Assistance Grants.* Through an experimental program of federally funded state assistance grants to local schools in a few states, test alternative ways of linking indicators to resources for purposes of producing school improvement where it is most needed (separately authorized at $50 million as a part of the title on National Programs).

States would be allowed to use up to 20 percent of Basic Grant funds for the development of performance indicators and implementation of their reform plans.

This plan builds on the objectives of the Perkins Act but would depart considerably from current policies with respect to the means to accomplish the objectives. Federal resources and technical assistance would be concentrated on improving the quality of vocational education in schools where the needs for improvement are the greatest. At the state level, the emphasis would be on encouraging the reform of vocational education and its integration with academic education, and on increasing the state capacity to implement improvement goals and allocate resources, based on indicators of the performance of vocational institutions and programs.[31]

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[31] William Clune, "Reflections on the Federal Role in Vocational Education: Lessons from the State and Local Reforms of the 1980s," paper prepared for NAVE, 1989.

Comprehensive Performance Indicators

A fundamental aspect of the plan is that each state would develop a comprehensive set of performance indicators. The performance indicators would measure the success of vocational education in serving different populations of students, meeting state needs, and accomplishing the six objectives of reform. Most states measure the academic performance of all elementary and secondary students routinely, and several either now have or are now in the process of developing more comprehensive indicator systems. Yet few of these indicator systems include much beyond rudimentary measures of vocational performance. The development of indicator systems for secondary vocational education would build on and blend with broader statewide efforts.

Purposes of Performance Indicators

Vocational performance indicators would serve three main purposes. First, the indicators would assist state officials in setting goals and direction for the improvement of vocational education. Strategies would be modified as improvement proceeds. The information derived from the indicators would create incentives for reform by provoking questions from vocational education officials, legislators, governors, teachers, and others about what vocational education is accomplishing and what they believe it should accomplish. Second, the publication and widespread distribution of information about the performance of vocational programs would challenge localities to improve performance. The information produced could, ultimately, provide a basis for allocating federal and/or state resources to increase performance. Finally, our review of current state academic reforms indicates that reliable performance information can fuel the public demand for serious program improvement and public willingness to provide the resources necessary to accomplish that improvement.

Comprehensiveness

In order to ensure fairness and address a wide range of improvement goals, the indicators developed by the states should measure performance in four main areas. These areas are:

- *Academic Achievement*: Academic course work taken by students in relation to vocational course work, and gains in the academic achievement of students in relation to prior achievement, courses taken, and plans after high school.
- *Vocational Attainment and Skills*: Vocational credits accumulated by students in different course areas, the coherence and concentration of the course work taken, occupational competencies achieved by students, rates of school attendance, and rates of graduation from high school.
- *Employment Outcomes*: Employment experience over time and the earnings of vocational course takers, skill levels of jobs obtained, the supply and demand for graduates of vocational programs, and student and employer satisfaction.
- *Postsecondary Continuation and Attainment*: The rate of enrollment in postsecondary programs of different kinds, the academic and vocational preparation of the enrollees, the "match" between students' high school and postsecondary vocational credits, and the proportion of postsecondary vocational credits at introductory and advanced levels of instruction.

Institutional measures of the quality of vocational programs and resources available at the local level could be included, such as the nature and extent of placement services, the availability of cooperative education and area vocational centers, and the extent and types of teacher professional development.

Maintaining a wide range of indicators is important for number of reasons. Secondary vocational education serves different purposes for different students, implying the need for indicators that reflect this diversity of purposes. Also, the use of a single indicator, or only a few indicators, can seriously distort incentives for performance. For example, placement rates are often greatest in fields with many low skilled and low paid jobs. Therefore, measuring placement rates without measuring the skill levels of jobs or earnings could encourage placements in low quality jobs. Including a measure of the skill levels of jobs as well as placement rates provides a more balanced picture and avoids perverse incentives.

Comparability Across States

To facilitate national comparisons and to serve as a stimulus for reform, performance indicators developed by the states should mean the same thing from one state to another insofar as possible. As described later, it would be the responsibility of the federal office to establish a core of indicators that would be common across the states. The federal office would work with state officials in developing these indicators.

Comparable data would enable the publication of national reports on vocational participation and performance well beyond what is currently possible. The reports would be designed to capture public attention through themes, such as "the preparation of American youth to work." The reports would describe the occupational skills of youth, their "job readiness," their academic skills, their employment, and their further education. Over time, the reports would describe trends in youth performance.

Access

A major assumption of the proposal for performance indicators is that measurement can have healthy effects by calling attention to the educational problems and successes of underserved groups, including students who are disadvantaged, handicapped, female, or limited-English proficient. For each of the four kinds of indicators, separate results would be shown for each of these categories of students (and possibly others). A major aspect of the proposed plan for developing performance indicators is demonstrating the extent and reliability of information about the quality of vocational education and its outcomes for special populations.

Value-Added

In order to provide fair appraisals of the academic achievement and occupational skills of students, the performance systems developed by the states should be capable of measuring *gains* in academic achievement and occupational competencies, given differences in initial student achievement and abilities (or the value-added by vocational course work). Demonstrating gains rather than absolute change is particularly important for vocational education, since many students who take a lot of it may have poorer initial achievement than other students. Testing programs in many states are sufficiently developed to allow the determination of value-added achievement at the school level.[32] For occupational skills, 13 states have testing programs for vocational students and 7 states are in the process of developing the capability. An additional 11 states are considering the development of such systems.[33] Finding ways of directly measuring, or adequately representing, gains in students' academic achievement and occupational skills is a major challenge in the implementation of performance indicators.

To begin the indicator process, two years after reauthorization all states would collect and report data on a limited "core" set of indicators on a sample of students in four areas: (1) the academic achievement of students who complete or drop out of high school and the amount of academic and vocational education they took; (2) the placement rates and earnings of students with different post-high school plans; (3) the subsequent postsecondary enrollments of students and relationships between vocational and academic courses taken at the secondary and postsecondary levels; and (4) detailed information on all indicators for disadvantaged, handicapped, and female students. Most of the employment information would be fairly cost-efficient to obtain through state unemployment insurance records that are already in accessible computerized form.

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[32] Report of the OERI State Accountability Study Group, *Creating Responsible and Responsive Accountability Systems* (Washington, DC: U.S. Department of Education, September 1988); Ramsey Seldon, personal communication.

[33] Michael J. Feuer, *Performance Standards for Secondary School Vocational Education* (Washington, DC: Office of Technology Assessment, April 1989).

State Reform Plans

To create the climate of reform at the state level, states would be required to develop and submit to the federal government *state reform plans* that lay out priorities and strategies for improving vocational education and accomplishing the six objectives of federal policy. The plans should be treated by the federal office as a contract for performance rather than the usual compliance documents. Included in the plans would be strategies for using federal, state, and local funds to bring about change. To be most effective, the development of performance indicators would be undertaken as part of the statewide plan. These overall improvement plans would focus on the entire system of secondary vocational education in a state. Some states might implement a vocational improvement plan with similar objectives to the Local Improvement Program part of the Basic Grants Program. Others might undertake initiatives to improve, for example, vocational teacher education, certification, or recruitment. Some states might undertake initiatives to expand job opportunities for youth and, working with schools and employers, to place students in jobs. Other states might emphasize better links between secondary and postsecondary vocational education.

The federal office would work closely with the states in the development of these plans. States would be required to submit draft reform plans 18 months after passage of the federal legislation. After feedback from the federal office, final plans would be required one year later. Plans deemed unacceptable by the federal office would be resubmitted no later than three years after reauthorization. States would be required to update approved plans on a two-year cycle. It is expected that, as the capacity of states to implement reforms expands over time, the scope and direction of state plans would change.

Local Improvement Grants

The current funding categories and allocation requirements would be replaced with highly targeted but competitively awarded grants for program improvement to schools with large concentrations of at-risk students. The purpose of the grant program would be to provide schools with enough resources and flexibility to upgrade their vocational programs and ensure that at-risk students have the assistance necessary to succeed in those programs.

Improvement Objectives

The specific goals of the Local Improvement Grants Program parallel the recommended objectives of federal legislation.

- **Revise and upgrade the content of vocational courses** to increase skill levels and to provide the range of broad transferable and job-specific skills needed by different students.
- **Align and integrate high school academic and vocational education** by developing new applied learning courses that integrate instruction in academic and vocational skills and requiring students in well-defined vocational programs to achieve mastery of both specific job skills and core academic skills.
- **Increase the placement of high school students in jobs that use the skills acquired** in high school by creating or enlarging job placement centers, increasing contacts between vocational teachers and employers, or establishing organizational arrangements with local employers where part of the responsibility for linking high school students with good jobs should lie.
- **Increase the continuity of vocational training between secondary and postsecondary** institutions by working with representatives from postsecondary education. Administrators could establish sequences of training that cut across institutional boundaries.
- **Ensure that at-risk students**, particularly drop-out prone students, handicapped students, limited-English speaking students, teenage parents, and women enrolled in nontraditional programs **obtain the assistance necessary to enroll and succeed in upgraded vocational programs**. Assistance could include supplementary tutoring to students with basic skill deficiencies *if* linked directly to an upgraded vocational program.
- With the assistance of the state office, **design and collect performance measures** intended to assess the success of these specific program initiatives, including measures of academic skills, occupational competencies, program completion and quality, and job characteristics such as wages, occupation, and industry.

With these objectives, school initiatives undertaken through the Local Improvement Grants Program would be directed to core improvements in vocational education and would reinforce and support the basic objectives of state reform efforts. All schools (and the districts through which they would apply) would be strongly encouraged to undertake improvement initiatives reflecting at least three of these objectives, including performance measures.

Targeted Competitions

States would conduct one competition annually for Local Improvement Grant awards. States would identify the specific schools (including area vocational schools) eligible for grants using a widely available poverty criterion. (At the school level, eligibility for a free or reduced-price lunch may be the only such criterion, although one-high-school districts might be able to provide an overall poverty rate for the district using census data). We recommend that eligibility for the Local Improvement Grants should be limited to schools that fall below a poverty threshold drawn so that the number of eligible schools is approximately 50 percent greater than the number of schools for which funds are available in the first year. This larger pool of schools would provide states with flexibility to select schools with the most promising plans. Grants would be awarded to schools that demonstrate the greatest willingness and capacity to undertake school-wide reform initiatives with the funds they receive.

Minimum-Sized Grant

To provide schools with sufficient resources to undertake major improvement initiatives, we recommend a minimum-sized grant of $50,000 per year for schools with a total between 100 and 500 students and $100,000 per year for larger schools. (Schools with less than 100 students could receive a pro-rated share of $50,000.) Simultaneously expanding job placement and job development efforts, integrating curricula, accelerating learning for at-risk youth, and coordinating programs with postsecondary institutions will require a wide range of activities. Schools may need to hire additional personnel, provide released time and summer programs for teachers, obtain outside assistance, and purchase curricula and materials--activities that cost a great deal of money. The minimum award sizes specified are basically equivalent to hiring one ($50,000) or two ($100,000) new full-time professional personnel.

Grants of this size are also equivalent to the median current Perkins Act grants to area vocational school districts (which typically consist of one school). The median Perkins grant to a separate area vocational school district is over $90,000.

Innovative vocational programs visited in the course of NAVE studies of exemplary schools spent more than this amount on reform per year over several years beyond regular support of vocational education. In one case, a school created a new computer program which was integrated into several other ongoing academic and vocational programs. The developers said they would not have been able to create the program without substantial additional funds from the district's federally funded Magnet Schools program. The funds from the Magnet Schools program considerably exceeded the amount that could have been obtained by the school through the Perkins Act.[34]

Awarding all Local Improvement Grants to schools through a single competition with substantial awards also means that comprehensive high schools will be able to compete equally with area vocational schools and other special institutions. This ability is significant in the light of NAVE's finding discussed earlier that area vocational school districts currently receive a disproportionate share of federal funds in relation to enrollment. Area vocational districts are currently more likely to receive federal funds than regular school districts, receive on average larger amounts of funds, and deliver a relatively small amount of all vocational credits.

Supplement and Not Supplant

To guarantee that the funds received by schools under the Local Improvement Grants add to total school resources, a requirement should be included in the federal legislation that funds received should "supplement and not supplant" other resources from federal, state, and local sources. The test for "non-supplanting" in the law and regulations should be that:

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[34] Becky J. Hayward and Nancy Adelman, *Exemplary Secondary Vocational Education: An Exploratory Study of Seven Programs*, NAVE Contractor Report (Washington, DC: Policy Studies Associates, February 1989).

- In districts with more than one school, schools aided under a Perkins Act grant should receive at least the same level of funding per student from other sources as schools that do not receive assistance under the Act.

- In all districts, schools receiving aid under a Perkins Act grant should receive at least the same level of "real support" per student (dollars adjusted for inflation) from other sources as they received in the prior year.

- Schools receiving grants and students participating in improved programs should receive an equitable share of services funded under other federal, state, and local programs for disadvantaged or other special populations.

Note that these criteria apply at the school level. The advantage of criteria based on the school is that funding and costs can be much more easily determined and compared than at the level of specific services provided to students, as is the case under current policies. The current matching, excess cost, and maintenance of effort restrictions on the use of vocational education funds could be eliminated if these criteria were adopted and regulations developed to implement them.

To allocate funds, a competition is more desirable than a formula for several reasons. A competition generates ideas for change that may not arise when potential recipients know for sure that they will receive funds. By limiting the competition to 50 percent more schools than can be funded, the odds of an eligible local school receiving an award are sufficient to warrant the time and energy of school personnel in preparing proposals. At the same time, a true competition provides greater assurance that local recipients will use federal resources to expand services rather than to substitute federal for state and local aid. With formula allocation, schools can predict what they will receive with near certainty and build these amounts into their local budgets. The combination of competition and the targeting of funds on schools provides a much simpler basis for cost accounting (to implement the proposed non-supplanting rule) and for ensuring the additivity of federal funds.

Program Demonstration Grants

A Program of Demonstration Grants to local schools is also recommended. It would be designed to provide states with the means to conduct demonstrations and rigorously evaluate alternative approaches to vocational education. States would award grants to local schools to develop the programs. Programs would be evaluated by outside evaluators to determine the sources of their effectiveness. The demonstrations would expand the base of reliable knowledge about effective practices and policy alternatives in vocational education. Once best practices were known, support would be provided to disseminate the results of these evaluations and assist other local school districts in using the knowledge acquired.

The Demonstration Grants would be awarded in a manner similar to the Local Improvement Grants. Awards would be made competitively to schools to support the translation of their ideas into working demonstrations of new approaches to important problem areas in vocational education. The competitions would address the same objectives for improvement as the State Reform Plans and the Local Improvement Grants. The demonstration grants would focus, however, *on one objective at a time*, such as the integration of academic and vocational curricula, rather than on the overall upgrading of programs in a school. Unlike Local Improvement Grants, all schools in the state would be eligible to compete for support. States would be required, however, to select a portion of demonstration projects from schools that were eligible for but did not receive Local Improvement Grants, in order to ensure that some programs addressed at risk students. (Schools that receive Local Improvement Grants could also receive a smaller additional grant award to become a demonstration site.) The same supplement-and-not-supplant provision but not the minimum grant size requirement would apply.

Once selected as a demonstration site, a school would develop an evaluation plan meeting certain state-specified standards. The purpose of these evaluations would be to determine the effectiveness of different approaches to improve vocational education programs. Evaluations would include a mix of both descriptive information on implementing the demonstration as well as assessment of its impact on students. The demonstration and evaluation activities are intended to provide a basis for the development of state-level knowledge-based strategies for the improvement of vocational programs in the schools. A portion of the demonstration sites would also be nominated by their states for national evaluation. National evaluation is described in chapter 4, the Federal Role in Vocational Education.

States would be encouraged to make awards for both demonstration and dissemination grants with funds from the Demonstration Program. Grants for demonstrations would support the development and pilot testing of innovative programs to the point where results could be evaluated. Sites with proven approaches would receive smaller dissemination grants to assist other schools in adopting the new practices.

Experimental State Assistance Grants

The last component of our proposed federal policy for secondary vocational education is to test alternative ways of linking performance and improvement by allocating resources on the basis of information from indicators. The program would operate as follows. The 10 percent of states that make the greatest progress in developing indicator systems during the first three years of the legislation would be awarded grants by the federal office to begin implementing a strategy for tying resources to performance information. Grants to the states that are selected would be of sufficient size to provide real tests of the alternative strategies implemented and the basic issues of policy involved. Several different approaches should be encouraged. A separate budget of $50 million in the National Programs title is proposed to support the program of Experimental State Assistance Grants.

Information can be linked to performance in various ways. First, the publication and widespread public distribution of data about the performance of vocational education in a state could serve as a stimulus to improvement by calling attention to both success and problems. Second, the information resulting from a state's indicator system could be used to develop and set performance standards. Many states already set standards in vocational education and tie those standards to state resources through policies that encourage particular instructional arrangements. As discussed elsewhere,[35] states mandate the content of vocational courses, set minimum hours of instruction to qualify for state support, and establish course sequences required for students to complete vocational programs. Indicators of performance would allow states to establish outcome standards and assess how well the standards are met by the state, by districts, or by schools.

Performance information can also be linked to the distribution of funds. The resources that institutions have available to improve and the incentives for them to improve are affected by the types of financial arrangements established. One approach is to use performance information to identify low-performing institutions and provide the financial and other assistance that would be most helpful to them. Special grants could be distributed to those schools. A second approach is to distribute resources to the institutions or programs showing the most improvement or increase in performance. A third approach is to reward schools or districts in direct proportion to how well they are performing in relation to schools in comparable communities or with similar students. The resources distributed under each approach could be direct grants of funds in combination with state-provided (or other) technical assistance. Performance-based allocation strategies developed by the states would, in all likelihood, combine various incentive schemes and forms of assistance.

The experimental grant program would help states and the federal government gain experience with a wide range of alternatives for linking indicators to resources. It would also provide important information for federal policy on performance accountability in the next reauthorization. States would be selected to participate in the program by the federal office on the strength of their indicator systems and proposed strategies for linking indicators and resources. States would be chosen to reflect alternative approaches so as to provide the information needed to develop future policy.

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[35] National Assessment of Vocational Education, *Second Interim Report*, pp. 2-23.

CHAPTER 3

POSTSECONDARY VOCATIONAL EDUCATION

INTRODUCTION

Postsecondary vocational training is a growing enterprise that is central to the educational mission of less-than-baccalaureate institutions. A total of 4.3 million "vocational" students are enrolled at community colleges, two-year technical colleges, public vocational technical schools, and proprietary schools. Three-fourths of all the students at these institutions major in vocational subjects, and over the past two decades the percentage of postsecondary students enrolled in vocational education has grown substantially. Most of the vocational credits in less-than-baccalaureate institutions are earned at community colleges (61 percent). Public technical institutions and proprietary schools account for another 23 percent and 15 percent, respectively, of the vocational credits. Although community colleges may have been started to prepare students for continued academic education in four-year institutions, this goal was never fully realized, and over the years community colleges have become the major providers of postsecondary vocational training. Thus, vocational training is now the principal educational mission in community colleges, as it has always been in other less-than-baccalaureate postsecondary institutions.

Students enrolled in postsecondary vocational programs are demographically diverse, drawn from all economic strata, races, age groups, and levels of ability. Compared with students at four-year colleges, however, postsecondary vocational students are more likely to be from working-class and poor families, from racial and ethnic minority groups, older, independent of their parents, and enrolled part-time.

The reasons that students choose to enroll in postsecondary vocational programs are many and complex--as are their subsequent decisions about how much training they need and whether to complete a postsecondary credential. Although many students enroll to earn a college degree, it cannot be assumed that all students intend to earn an associate degree or certificate. Students may enroll to take a limited sequence of courses to enter a particular field, or to enhance existing career skills. They may enroll to explore career alternatives or to satisfy avocational interests. This mix of educational objectives is inevitable among institutions that offer enrollment to virtually all students who wish to attend.

Diversity in student expectations and ability poses a difficult problem for institutions trying to accommodate a wide array of student needs--not simply those of the traditional, degree-seeking college student. This diversity also suggests that not all students who leave without earning a credential can be considered "dropouts" or "educational failures." On the other hand, noncompletion of degrees should not always be condoned under the assumption that the student has fulfilled some alternative but equally valid educational purpose.

The main problem facing postsecondary vocational education is that many students do not stay in school long enough to receive comprehensive training, regardless of whether they actually earn a degree or certificate. Students without sufficient training are unlikely to obtain jobs in the field for which they have trained. Our evidence indicates that the economic benefits of vocational education are greatest for students who complete a multicourse sequence of vocational training. These students obtain better-paying jobs that use their training at greater rates than do other students. Unfortunately, a large number of students enrolled in vocational programs earn very few credits; among a sample of recent high school graduates, almost half who entered less-than-baccalaureate institutions left without completing a degree or certificate.

Low rates of program completion and limited coursetaking prevail among all types of students regardless of race, sex, economic status, or ability. However, the problem is most serious among minorities, economically disadvantaged students, and the growing number of high school "vocational students" who pursue additional postsecondary training. This limits the extent to which such students get jobs in the fields in which they have trained, and as a result, the wages they are paid.

SUMMARY OF KEY FINDINGS

The National Assessment of Vocational Education (NAVE) conducted research in five main areas: enrollment in postsecondary vocational education, educational attainment, training related placement, institutional quality, and finance. Key findings from research in each of these areas are summarized below:

Who Enrolls in Postsecondary Vocational Education?[36]

Enrollments in vocational education at the postsecondary level are high, and over time, the proportion of total course work in vocational subject areas has increased. Community colleges are the main providers of vocational training.

- Thirty-five percent of all undergraduate students major in vocational fields.
- Students who reported majors in vocational subjects account for 78 percent of total enrollments in less-than-baccalaureate institutions.
- The share of vocational course work taken by members of the high school class of 1980 who enrolled in community colleges was 18 percent higher than it was for the high school class of 1972.
- Among students attending less-than-baccalaureate institutions, community colleges account for 62 percent of vocational credits earned. Twenty-three percent of vocational credits are earned by students initially enrolled in public technical institutes (technical colleges and vocational technical schools), and 15 percent are earned by students at proprietary schools.

Less-than-baccalaureate institutions draw students from most segments of the population and, compared to four-year colleges, are more likely to attract a cross section of students of different ages, races and economic backgrounds and levels of ability. Compared to students at four-year colleges, students at less-than-baccalaureate institutions are more likely to be female, black and Hispanic, from families with lower incomes, older, and financially independent of their parents (see table 3.1).

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[36] Findings on enrollments and course-taking draw heavily on research performed for NAVE by Norton Grubb, *Access, Achievement, Completion, and Milling Around in Postsecondary Vocational Education*, NAVE Contractor Report (Berkeley, CA: MPR Associates, 1989); Robin Horn, "Special Analyses," Decision Resources Corporation, 1988; and John Tuma, Antoinette Gifford, and Susan Choy, *Student Financial Aid and Postsecondary Vocational Education*, NAVE Contractor Report (Berkeley, CA: MPR Associates, 1989).

Less-than-baccalaureate institutions attract a high proportion of older students and, especially at community colleges, students who are enrolled part-time. Many of these students must balance family and work responsibilities while also attending school.

- Thirty-four percent of community college students and 39 percent of public vocational technical school students are over age 30, compared with 14 percent at four-year colleges.
- Sixty-one percent of community college students are enrolled part-time, compared with 22 percent at four-year colleges.

Furthermore, vocational students are drawn from all ability levels, but compared with four-year college students and academic students at community colleges, vocational students are less likely to be of high ability and more likely to be of low- and mid-level ability.

Not all less-than-baccalaureate institutions attract the same mix of students. The results in table 3.1 indicate that minorities, disadvantaged students, and women are more likely to enroll in schools that offer short-term certificate-oriented training (public vocational-technical and proprietary schools), rather than the longer term programs that lead to an associate degree offered at community colleges.

- At proprietary schools, 65 percent of the students are women and 35 percent are black or Hispanic. At public vocational technical schools, about 60 percent of the students come from families with incomes less than $23,000.

Our research also indicates that high school vocational students increasingly go on to college, where they comprise a large share of the students in postsecondary vocational education. Between the high school classes of 1972 and 1980, postsecondary enrollments of students who described themselves as "vocational" in high school increased by 22 percent. Thirty percent of the students enrolled in community college vocational programs were also vocational students in high school. Forty-one percent of students at public technical institutes and 46 percent at proprietary schools were high school vocational education students.

Table 3.1

Percentage of Students Enrolled in Postsecondary Institutions, by Student Characteristics, 1986

Student Characteristics	Four-Year Institutions	Two-Year Public	Public Vocational	Proprietary
Sex				
Male	47%	43%	44%	35%
Female	53	57	56	65
	100%	100%	100%	100%
Race/ethnicity				
American Indian	1	1	1	1
Asian	5	6	4	3
Black	8	9	14	21
Hispanic	5	9	7	14
White	82	75	73	60
Family income				
Up to $23,000	20	42	62	58
$23-$50,000	42	41	31	32
$50,000 or more	28	17	6	8
Age				
Up to 23	73	44	40	54
24-29	13	21	22	21
30 or more	14	34	39	25
Enrollment status				
Full-time	78	39	72	84
Part-time	22	61	28	16
Dependent status				
Dependent	73	48	40	46
Independent	26	51	59	53

SOURCE: National Postsecondary Student Aid Survey, Fall, 1986.

NOTE: Numbers may not add to 100 percent due to rounding.

What Types of Training Do Students Receive?

Institutions vary widely in the balance between an academic and vocational curriculum. At community colleges, a majority of the credits taken are in academic subjects; 35 percent of credits earned are in vocational subjects. Even students majoring in vocational areas take a substantial share of their course work in academic fields. In contrast, students in proprietary schools and technical institutes take about 70 percent of their course work in vocational fields.

There is little difference in the number of total credits or vocational credits earned by students at community colleges, technical institutes and proprietary schools. The average student earns about 47 total credits. While some students receive an in-depth program of study, there are large numbers of students whose training is quite meager.

- Vocational concentrators (defined as students with a majority of their credits in vocational subjects) at community colleges earn an average of 26 vocational credits, while students at technical institutes average 27 vocational credits and those at proprietary schools average 25 vocational credits.
- One-third of all postsecondary vocational students take less than 12 credits in vocational subjects, and 50 percent earn less than 24 vocational credits.

The rate at which students who enroll at community colleges complete degrees is low and has declined over time (see table 3.2). Nearly all community college students who complete degrees earn associate degrees. Completion rates are higher at public technical institutes and proprietary schools largely because these institutions award many more certificates that require much less course work than does an associate degree. These results, however, are limited to a sample of recent high school graduates who entered college shortly thereafter. The sample did not include older students and mid-career adults, for whom measures of degree completion and non-completion are less meaningful.

- Within four years after high school graduation, 19 percent of the high school class of 1980 entering community colleges earned a college degree or certificate. In contrast, the completion rate for the high school class of 1972 was 23 percent.
- Overall completion rates at public technical institutes and proprietary schools (degrees and certificates) were 36 percent for the high school class of 1980.

Table 3.2

Completions and Noncompletions Among Students Entering Less-Than-Baccalaureate Institutions

Student Outcome	Community Colleges	Public Technical Institutes	Proprietary Schools
Total completions for			
HS class of 1980	19.1%	36.1%	36.1%
Associate degree	17.1	18.1	12.5
Certificate	2.0	18.0	23.6
HS class of 1972	23.0	32.5	38.5
Leaves without credential			
HS class of 1980	42.0	46.5	42.2
HS class of 1972	30.0	35.8	40.5
Transfers to other institutions[a]			
HS class of 1980	25.2	8.6	13.2
HS class of 1972	28.2	17.8	16.0
Still enrolled in first school entered			
HS class of 1980	13.8	9.0	14.0
HS class of 1972	19.9	14.0	5.0

SOURCE: High School and Beyond Survey, Seniors, 1980 and National Longitudinal Survey, High School Class of 1972.

a/ Includes transfers to all other postsecondary institutions, not just to four-year colleges.

Noncompletion rates at less-than-baccalaureate postsecondary institutions are high and have increased over time. Because of the increased rates of noncompletion, fewer students have received advanced level vocational training.

- Data from the High School and Beyond Survey for the class of 1980 show that 90 percent of the students in this sample who enrolled in community colleges, technical institutes and proprietary schools expected to earn a degree or certificate, but about 42 percent left school without earning either within four years (table 3.2). Although some students remaining in school after four years will go on to earn degrees, the majority of these students will ultimately drop out. Consequently, these estimates of noncompletion are conservative.

- A comparison of the community college experience of two different high school classes (1972 and 1980) indicates that noncompletions for the class of 1980 increased by 40 percent over those for the class of 1972 (table 3.2). Over the same period, the proportion of students awarded two-year associate's degrees declined by 17 percent. There was virtually no change in the percentage of students receiving certificates, which require shorter training.

Noncompletion is an institution-wide problem that applies to students who concentrate in both vocational and academic fields. However, because less-than-baccalaureate institutions are largely, if not predominantly, vocational in the education they provide, it is appropriate that vocational education policy address the noncompletion matter.

The problem of noncompletion and limited training exists among all groups of students, but it is significantly worse for minorities and disadvantaged students.

- At community colleges, black students earn 30 percent fewer credits than white students and fail to earn a degree or certificate at a rate 20 percent higher. Fifty-one percent of black students who enter community colleges leave before completing their program. Hispanic students average 16 percent fewer total credits than white students, although they earn degrees at about the same rate. Dropout rates are significantly higher for the most economically disadvantaged students and their credits earned, both total and vocational, are much less than those earned by more affluent students.

- Significant differences in non-completion also exist among groups of students at public technical colleges and proprietary schools. At proprietary schools, black students leave school without a degree or certificate at a rate 40 percent higher than that of white students, and at public technical institutes black noncompletions are 23 percent higher than those of white students. Similar differences exist among students from different socioeconomic backgrounds.

Although high school vocational students often continue their training at the postsecondary level, this group frequently experiences difficulty completing postsecondary programs. There is both considerable need and opportunity to assist these students in making a successful transition from secondary to postsecondary vocational education.

- Among students entering community colleges, 54 percent of those who were high school vocational students leave without earning a degree or certificate.

What are the Economic Benefits of Postsecondary Vocational Training?[37]

Students take postsecondary vocational training for a variety of reasons, but by far the most important purpose is to obtain economic benefits. Students expect that vocational training will increase their employability, help them to get a job in their chosen career field, and of course, enhance their earnings. To determine whether such benefits are realized, NAVE examined a nationally representative sample of students from the high school class of 1980 who obtained vocational training at community colleges, public technical institutes, and proprietary schools, and who were no longer enrolled in college. We examined the economic status of students who had taken different types and amounts of vocational training about 5 1/2 years following high school graduation. Overall, about 19 percent of the students were unemployed at least once over the course of a year (from March 1985 to February 1986), with about 9 percent unemployed in any particular month. About 58 percent of the vocational course work that students took was later used by students who got jobs related to their training, and the average hourly wage rate of those employed was $6.67.

The degree to which students benefit from vocational training depends on the amount of training received and the coherence of the program taken. Results in table 3.3 show that students who take large amounts of vocational training in their major subject area are more likely to be employed and are more likely to be employed in their field of training than students who take small amounts of vocational training in their major subject. Students who obtain degrees or certificates, or who otherwise take a substantial amount of vocational training, are at a substantial advantage in entering the labor market. At the same time, students with limited training have poorer labor market outcomes.

- Compared with students taking many vocational credits in their major area (30 to 49 credits), those with less than 12 vocational credits are 28 percent more likely to be unemployed and are 14 percent less likely to get a job that uses their vocational training (see table 3.3).

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[37] These findings are based on a study conducted for NAVE by Robin Horn entitled *Economic Effects of Postsecondary Vocational Education*, NAVE Contractor Report (Washington, DC: Decision Resources Corporation, 1989).

NAVE found that the economic benefits we measured are limited to vocational course-taking that occurs in a student's major field or subject area. Vocational training dispersed among many fields, though useful for students engaged in exploring career alternatives, adds little to the student's prospects for employment or job placement in a field related to the training. This suggests that a coherent program of training, not just the total amount of courses taken, is an important factor affecting the benefits of vocational education.

Students with valued occupational skills are also deemed more productive in that they are paid more. NAVE found that additional amounts of vocational training that are related to the field of employment result in substantial wage benefits.

- Students with "low" amounts of job-matched vocational credits earn an average of $6.59 per hour, while similar students with a "high" number of credits matching their job earn $8.00.
- Vocational credits earned by students not matched to the jobs they receive contribute nothing to their earnings.

These findings indicate strongly the importance of helping students determine what fields of training they wish to pursue, constructing a program of study to provide a related sequence of courses, and helping to place students in jobs related to their training.

Students may obtain their vocational training in various types of institutions. After controlling for differences due to the characteristics of students enrolled in community colleges, public technical institutes, and proprietary schools, and their fields of study, we found that economic outcomes varied by type of institution. Students attending proprietary schools were more likely than those at community colleges or public technical institutes to experience unemployment, and were somewhat less likely to utilize their vocational training in the jobs they obtained. Among students who were employed, those who attended public technical institutes experienced lower hourly wages than those trained in community colleges or proprietary schools. An apparent difference in hourly wages (indicated in table 3.3) between students trained at community colleges and similar students attending proprietary schools is not statistically significant.

Table 3.3

Effects of Postsecondary Vocational Training on Employment, Course-Utilization and Earnings[a]

	Incidence of Unemployment[b]	Course Utilization Rate	Average Hourly Wage
Institution type			
Community college	18.9%	60.6%	$6.63
Public technical institute	16.5	60.3	5.92
Proprietary school	27.7	52.6	7.40
Number of vocational credits taken[c]			
Community college			
Low (12 credits)	16.1	47.5	6.58
Medium (30 credits)	10.6	62.5	7.05
High (50 credits)	6.8	72.7	7.39
Public technical institute			
Low (12 credits)	19.2	61.1	5.84
Medium (30 credits)	11.6	60.2	6.61
High (50 credits)	6.4	59.5	7.19
Proprietary schools			
Low (12 credits)	27.3	49.2	7.38
Medium (30 credits)	28.4	53.0	7.59
High (50 credits)	29.1	56.6	7.73
All			
Low (12 credits)	20.5	51.0	6.59
Medium (30 credits)	16.0	59.0	7.52
High (50 credits)	13.0	61.4	8.00

[a] Results are regression-adjusted means that control for student differences in sex, region, race/ethnicity, marital status, SES, ability quartile (multiple content area tests measured while trainee was a senior in high school), educational plans, high school program, and work history while a senior in high school, the number of postsecondary credits taken in language and humanities, science and math, social sciences, fine and liberal arts, and remedial courses, the types of institutions attended, the number of credits taken in each institution type, the degree attained, the vocational subject area from which the majority of the postsecondary courses were taken, additional postsecondary work and non-school training experiences, local unemployment rate, employment growth rate, and average manufacturing wage (all measured in 1982), and the number of months since the postsecondary training ended.

[b] Refers to the percentage of individuals with at least one spell of unemployment over a period of one year--March 1985 to February 1986.

[c] For unemployment and course utilization rates, "credits taken" refers to major subject area credits; for earnings, it refers to "job-matched" credits.

- Students enrolled in community colleges and public technical institutes experience similar rates of employment and likelihood of using their vocational training on the job (table 3.3).
- Proprietary school students are more likely to experience unemployment once or more during a year (28 percent) than similar students at community colleges (19 percent) and at public technical institutes (17 percent).
- Proprietary school students are about 13 percent less likely to get jobs that use their vocational training than students with similar amounts of training at community colleges and public technical institutes.
- The hourly wages earned by students from public technical institutes are about 11 percent lower than the wages of students from community colleges and 20 percent below wages of students from proprietary schools.

After controlling for differences in occupational field, amount of training completed, type of institution, and personal characteristics, we found no differences in the use of vocational training in subsequent employment by race, socioeconomic status, ability, or sex. In other words, students of different races and SES who take similar amounts of training choose similar fields and enroll in similar types of institutions, are likely to experience similar economic outcomes. However, research previously discussed shows significant differences in actual completions and the amount of credits earned between various groups in the population.

What Are the Characteristics of High-Quality Vocational Training Programs?[38]

The issues of what constitutes a high-quality vocational program and who has access to such programs are central to federal policy. Based on employer ratings of program quality and case studies of individual schools, NAVE found four main factors that predict program quality: the intensity of vocational instruction, the integration of theoretical and applied aspects of vocational instruction, the presence of active linkages with employers and others in the profession, and the quality of the job placement assistance provided to students. Although other factors were also important, the ones cited above were statistically significant across different types of institutional settings.

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[38] This section is based on a study conducted for NAVE by Rocco Depietro, Lou Tornatzsky, James Jacobs, and Michael Woods entitled *Predictors of High Quality Vocational Education*, NAVE Contractor Report (Ann Arbor, MI: Industrial Technology Institute, 1989).

NAVE's study of effective institutional practices revealed that the amount of equipment possessed by programs was not systematically related to employer ratings of program quality. Although programs differed considerably in the quality of their equipment, these differences were not sufficient to affect employer ratings. A program's equipment must meet some minimum threshold, and of course, programs want new equipment to attract students, but NAVE's findings suggest that additional outlays for equipment beyond this threshold may have diminishing returns for program quality. Since most of the Perkins Act program improvement monies are spent on equipment purchases, it may be wise to consider whether this is the most appropriate use of federal resources.

How Is Postsecondary Vocational Training Financed?[39]

Federal policy includes several different instruments for increasing access to postsecondary vocational programs and improving the quality of vocational training that students receive. The Perkins Act provides about $320 million in grants to postsecondary institutions to improve their programs and serve special populations. Although not specific to vocational education, federal student aid is also intended to increase the access of students to postsecondary education. By permitting students to afford a better education, it may also improve the quality of the education they receive. Federal student aid programs provide $4 billion to vocational students attending less-than-baccalaureate institutions, which is 10 times the amount spent on postsecondary training in the Perkins Act.

Although federal student aid is not designed to assist particular types of institutions, the distribution of aid has important consequences for the types of vocational training supported.

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[39] This section is based on a study conducted for NAVE by John Tuma, Antoinette Gifford, and Susan Choy entitled *Student Financial Aid and Postsecondary Vocational Education*, NAVE Contractor Report (Berkeley, CA: MPR Associates, 1989).

- Proprietary school students receive 25 percent of all federal student aid while such schools attract only 5 percent of total undergraduate enrollments. Public two-year colleges receive 13 percent of federal student aid, although their students are 38 percent of total enrollments.

- Eighty-one percent of proprietary school students receive federal aid, compared to 20 percent of the students at two-year public colleges and 42 percent of the students at public vocational schools.

Thus, through the Perkins Act, federal policy provides modest support for vocational training in public institutions. Through student aid programs, federal policy provides greater support for vocational training in public institutions and far greater support for private sector training.

Student aid provides a substantial share of the funds needed to attend college. Students receiving federal student aid average $2,666 per year, covering about 60 percent of their estimated total costs.

- Students in proprietary institutions average nearly twice ($3,394 yearly) the amount of aid received by students in two-year public colleges ($1,788) and public vocational institutions ($2,078).

- For students at public two-year colleges and proprietary schools who receive federal aid, the amount they receive covers 73 percent of the costs of attendance, including tuition and living expenses.

Both the Perkins Act and student aid policy are designed to make postsecondary education more accessible for the disadvantaged. The Perkins Act sets aside 22 percent of the basic grant for disadvantaged students. Since family income is one of the basic criteria determining eligibility for student aid, that aid is heavily targeted to disadvantaged students (see table 3.4). Overall, students from low-income families (under $11,000 per year) are four times more likely to receive federal aid than students from the most affluent families (over $50,000 per year). Within each institution type (public two-year, proprietary, public vocational), poor students receive student aid much more frequently than do affluent students. However, since the cost of enrollment is also an important determinant of who gets aid, moderate and upper income students attending expensive schools (e.g., proprietary schools) are

Table 3.4

Characteristics of Students Receiving Federal Aid, 1986

Characteristic	All Postsecondary Institutions[a]	Public Two-Year	Public Vocational	Proprietary School
Sex				
Male	34%	20%	32%	80%
Female	36	23	50	81
Race				
White	32	20	44	75
Black	56	30	43	92
Hispanic	41	25	33	87
Personal income				
Less than $11,000	61	48	61	94
$11,000-$22,999	50	28	43	87
$23,000-$29,999	40	23	39	82
$30,000-$49,999	20	9	33	69
$50,000+	15	5	32	55
Age				
Less than 23	39	23	41	80
24-29	34	23	51	89
30+	25	19	34	74
Enrollment status				
Full-time	47	38	53	82
Part-time	14	10	14	72

SOURCE: National Postsecondary Student Aid Survey, 1986.

[a] Total is for all students receiving federal aid, including those at four-year institutions.

more likely to receive federal aid than the poorest students attending low cost schools (e.g., community colleges).

Federal student aid plays a major role in financing vocational training in proprietary schools, but the primary source of support for vocational training in public sector community colleges and vocational-technical institutes is state and local appropriations. NAVE estimates that two-year public colleges obtain 65 percent of their total revenues from state and local government. Considered together, federal policies and state and local policies provide roughly equivalent resources for vocational training in public and private sector institutions.

The major forms of financial support for vocational training--student aid and state and local appropriations, provide similar incentives to postsecondary institutions. Both student aid and state funding formulas provide powerful incentives for institutions to maintain and increase enrollments. At community colleges, revenues are largely determined by the number of full-time equivalent students; similarly institutions dependent on student aid have powerful incentives to maximize student enrollment.

Under enrollment driven finance policies, the incentives to focus attention on student performance (e.g., persistence, completion, achievement, and job placement) are indirect and, at best, weak. While state funding formulas and tuition payments reimburse institutions for students who persist just as they do for new students (and in theory good performance should make an institution better able to attract new students), student enrollments and not outcomes remain the standard by which institutions are judged.[40]

Nor does the Perkins Act, which primarily specifies populations to be served and procedures to be followed, directly address issues of student outcomes. In light of the evidence presented on completions, course-taking, and training related placements, an emphasis on student outcomes is an appropriate role for federal policy.

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[40] There may be several reasons why enrollment-based financing provides insufficient incentive for institutions to emphasize student persistence. First, institutions that simply "replace" students who leave are rewarded as much as those whose students persist. In the 1960's and 1970's, when the pool of 18- to 24-year old students expanded greatly, it was simply easier for schools to admit new students than to initiate programs to retain ones already enrolled. Postsecondary institutions have been slow to recognize that, in a period of more limited enrollment growth, there could be financial rewards for those schools that improved student persistence and completion. A second factor is cost. Students in large introductory courses are less expensive to educate than students in more advanced courses that require expensive equipment and entail higher instructional costs. Both advanced students and students at risk of dropping out require additional, though quite different, services of an expensive nature--e.g., career counseling, job placement, remedial instruction, child care, transportation and other special support. These additional costs may create a financial disincentive for institutions to focus on improving completions. Finally, administrators fear that instituting more rigorous requirements might result in lower enrollments.

RECOMMENDATIONS FOR FEDERAL POLICY ON POSTSECONDARY VOCATIONAL EDUCATION[41]

Objectives

In any assessment of the possible roles of federal policy in improving postsecondary vocational education, it is important to observe that (1) Perkins Act funds are very limited; (2) other federal programs have parallel objectives designed to increase the access of disadvantaged students to postsecondary education; and (3) public policies that provide major support for postsecondary vocational training offer inadequate incentives for institutions to improve student outcomes.

There are several basic sources of support for postsecondary vocational training. At most, Perkins Act funds account for 5.7 percent of total revenues for vocational training at community and technical colleges. Federal student aid programs provide $4 billion to postsecondary vocational students, but at two-year public colleges the share of federal student aid for tuition and fees represents only about 12 percent of total revenues. State and local appropriations are the largest source of support, providing about 65 percent of total revenues for postsecondary vocational training in two-year public colleges.

All these policies are input oriented. They reward institutions according to their enrollment of students. None directly addresses the fundamental problem identified in NAVE's research--although postsecondary vocational training attracts students who might not otherwise have the opportunity to attend college, the majority of enrollees do not receive sufficient training, whether measured by completion of degrees or a sequence of related courses, to realize substantial benefits in the labor market.

Given these findings and the range of existing policies, we recommend that federal vocational education policy should help students complete a comprehensive and coherent program of vocational study and obtain jobs that make full use of that training. Clearly, federal vocational funding is inadequate to finance all the programmatic changes and services needed to achieve this goal. Rather, federal policy can stimulate change by providing incentives for postsecondary institutions to undertake improvements in program content and job placement that will produce measurable gains in completions, program coherence, and placements. This policy should have three basic objectives:

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[41] This sections draws heavily on a study conducted for NAVE by Stephen Barro entitled *Issues in Designing Performance Incentives for Vocational Education*, NAVE Contractor Report (Washington, DC: SMB Economic Research, 1989), and on E. Gareth Hoachlander, Susan Choy and Cynthia Brown, *Performance Based Policy Options for Postsecondary Vocational Education: A Feasibility Study*, NAVE Contractor Report (Berkeley, CA: MPR Associates, March 1989).

- **To improve rates of program completion and placement** in training-related jobs;
- **To provide special assistance to at-risk populations** for whom the problem of noncompletion is most serious; and
- **To improve the transition from secondary to postsecondary vocational education** in a way that results in a more coherent and comprehensive training program for students.

As it is currently structured, the Perkins Act is poorly designed to achieve these objectives. Perkins Act grants are input-and-process oriented. The dollars they provide are to be spent in certain prescribed ways, for certain kinds of services, and for certain groups of students. There is little in the Perkins Act to ensure, however, that spending federal funds will actually improve vocational programs. Some recipients of funds become so preoccupied with adhering to federal rules for allocating and using resources that these means become the ends of policy, with little evidence that funds accomplish their intended purpose.

The specific effects of the Perkins Act on postsecondary institutions are also of concern. About 79 percent of eligible postsecondary institutions receive Perkins Act grants in at least one category, but there is little evidence that the Act effectively leverages additional nonfederal resources for projects to improve the quality of vocational education.[42] Nor do other federal and state policies, which base funding on enrollments, adequately address the serious problems of limited course-taking, low completion rates, and lack of placement in jobs related to training.

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[42] For a discussion on the additivity of federal funds, see Volume II of NAVE's final report on the Implementation of the Carl Perkins Act.

Recommendation

We recommend that states use the Perkins Act funds they direct to postsecondary vocational education to develop a system of performance-based incentives. This system would use indicators developed by states and keyed to three areas of performance: educational attainments (e.g., program completions, advanced course-taking), occupational competencies, and labor market outcomes (e.g., employment, earnings). We recommend two specific mechanisms to encourage improvement: (1) dissemination of information to students, policymakers, employers, and the public on the performance of vocational education training institutions; and (2) distribution of federal vocational education funds to institutions in accordance with state-developed performance formulas.

Performance incentives would replace the current emphasis on inputs and process in the Perkins Act with financial incentives based on student outcomes. The change would (1) shift the emphasis in federal policy from compliance with rules for spending funds to obtaining better results for students; (2) induce vocational educators to use more of their state and local resources--not just the small amounts provided by the federal government--in ways that enhance student performance; and (3) create incentives affecting all postsecondary institutions, not just those receiving federal grants in one of the Perkins Act categories.

How Performance Incentives Can Improve Vocational Education

All performance incentive systems share two basic features: (1) a central role for measures or indicators of how well or poorly the suppliers of vocational education perform; and (2) a "feedback" mechanism through which information on past performance is used to encourage improved future performance. The basic premise underlying performance-based policy is that information on the performance of vocational institutions, suitably disseminated and linked to funds or rewards, can create strong incentives for programs to improve their performance. Improvements may occur as individual programs make greater efforts (through curriculum upgrading, better teaching or student job placements), or as resources are reallocated toward suppliers who perform best or exhibit the most improvement.

Performance incentives also encourage schools to contribute additional institutional resources for programs to enhance student performance. By increasing student persistence and, perhaps, by attracting new students through a reputation for high job placements and good earnings of graduates, performance standards can generate additional FTE-based revenue.[43]

After studying experiences under the Job Training Partnership Act (JTPA), other state employment and training programs, as well as approaches that states have used in attempting to introduce performance-based elements into their educational systems, NAVE recommends two specific performance incentive mechanisms:

1. *A performance information system* to disseminate information to students, policymakers, employers, and the public on the performance of vocational education institutions; and
2. *A performance-based funding system* to distribute financial aid to institutions according to performance-based funding formulas.

Performance Information

Performance information disseminated to students, employers, political authorities, and administrators can significantly affect the demand for high-quality vocational education. Armed with information on completions, job placements, and earnings, students can shift their enrollment toward suppliers with superior performance. The fact that "money follows students"--that is, revenues from tuition payments, student aid programs, and state appropriations are all linked to enrollment--could provide a strong incentive for programs to raise performance.[44]

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[43] For fear of discouraging enrollments, schools are typically reluctant to require that students demonstrate basic reading, writing, and computational skills. A study of Miami-Dade Community College, however, suggests that mandatory testing resulted in increased minority group retentions and no decline in overall enrollment (see John Roueche, George Baker, and Suanne Roueche, "Open Door or Revolving Door?", *American Association of Community and Junior Colleges Journal*, April/May 1987).

Disseminating information to other participants in the educational system--political authorities, administrators, and employers--also can contribute to raising performance. Evidence that some publicly supported institutions perform well and others do not can induce political authorities and administrators to shift funds among programs or to impose more rigorous oversight. Providing this information to employers could strengthen the resolve of administrators and political leaders to make budgetary and other decisions conducive to program improvement, and further encourage students to favor highly-rated programs. These concepts undergird the growing effort of states to develop indicators of general education performance.

Performance-based Funding

Under this strategy, performance information would not merely be disseminated, it would be linked directly to the receipt of funds. Distribution of federal vocational education funds would be determined by explicit state formulas based on measures of program performance and improvement. One feature of the Job Training Partnership Act that exemplifies this approach is the allocation of 6 percent of program funds as incentive grants to providers who exceed performance standards. Other examples of performance-based funding in education include a requirement in Florida that, to be eligible to receive state funds, vocational programs must maintain a job placement rate of 70 percent or higher. Tennessee allocates 5 percent of its higher education funding according to six different measures of institutional performance, while South Carolina provides monetary rewards to public schools and districts showing increases in academic achievement.

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[44] This approach rests on two assumptions: first, students are mobile and free to choose among alternative institutions and programs, and second, students value information on institutional performance in making decisions about where to enroll. The first condition is more likely to exist at the postsecondary level than at the secondary level because adult students can compare different public and private suppliers of vocational training. On the second requirement, the willingness of students to use performance information, there is some evidence that students consider various aspects of program quality in making enrollment decisions. For a discussion of this research, see E. Gareth Hoachlander, Susan Choy, and Cynthia Brown, *Performance-Based Policy Options for Postsecondary Vocational Education: A Feasibility Study*, pp. 92-100.

The rationale for performance-based funding is straightforward. Institutions that score high on measures of performance, or exceed a specified standard, receive more funds, and those that score low, or fall below a state's standards, would have their funding reduced.[45] Institutions would have an incentive to do well, and depending on the level of funding, resources would be reallocated from low to high performers.[46] In Tennessee, local administrators report many cases of institutional improvement in response to performance objectives, including changes in curriculum, student follow-up, counseling of students, and assessment of student capabilities.[47]

In contrast to the prescriptive grants that characterize the Perkins Act, performance-based funding for postsecondary vocational education has several advantages:

1. Performance-based funding decentralizes decisionmaking about how best to achieve agreed upon educational and labor market goals of vocational training. Performance-based funding eliminates federal attempts to specify program content or services; in exchange, institutions are held accountable for the results.

2. Because money "counts," performance-based funding sends a clear message that improving student performance, however performance is defined and measured by the state, is the goal of federal policy. The federal performance standard system developed for JTPA has transformed this program (compared with its predecessor, the CETA program) into one that is outcome

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[45] A fundamentally different type of performance-based funding would target resources on institutions with the lowest level of performance.

[46] Assuming that performance-based funding is limited to federal vocational education funds, the reallocative effect would, at most, be quite modest.

[47] Hoachlander, Choy, and Brown, *Performance-Based Policy Options*, p. 73.

oriented.[48] Federal performance standards have driven deep into the JTPA service delivery system through the parallel development of performance contracting and competency measures for youth outcomes.

3. Instead of using limited federal funds to purchase specific programmatic services, performance-based funding is likely to encourage institutions to use more of their own resources to improve programs so they will earn performance awards.

Measures of Program Performance

Measuring performance is a prerequisite for performance-based policy. The feasibility of creating performance incentives, their likelihood of having beneficial effects, and their chances of gaining political and professional acceptance, all depend on measurement that is fair, objective, and not unduly burdensome. The main initial activity undertaken at the postsecondary level by states should be the development of indicators. The three types of outcomes most relevant for vocational education are labor market outcomes, learning outcomes, and "educational attainment" outcomes. States would be required to develop measures and, eventually, to award incentive aid in accordance with all three types of indicators. Each is discussed in the sections that follow.

Labor Market Outcomes

Labor market indicators include the rate at which students are placed in jobs, the degree to which placements are training related, the duration of employment and unemployment, and the level of earnings at entry and at specified times thereafter. Given that the basic purpose of postsecondary vocational education is to prepare students for jobs, labor market indicators must play an important role in assessing program performance.

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[48] Erik Butler, *The Search for a Bottom Line in Vocational Training: What Lessons Are Offered by the Job Training Partnership Act?*, NAVE Contractor Report, October 1988. While citing problems with specific performance standards and with the system of competency-based training, Butler concludes that "As policies which will underlie vocational education are developed, JTPA's experience should encourage planners that a focus on outcomes can be achieved." (p. 21)

The principal problem with measuring labor market outcomes on a state or programmatic basis has been the inadequacy of data.[49] Student followups administered by schools are frequently characterized by unacceptably high levels of nonresponse and lack of objectivity in determining whether job placements are related to the student's field of training. To establish objective indicators of training-related placements, NAVE has built on work started by the National Occupational Information Clearinghouse (NOICC) linking fields of training to different occupational classifications.

An important recent development is the increased feasibility of monitoring many labor market outcomes at relatively low cost and without intrusive follow-up efforts. This monitoring can be accomplished by drawing on existing administrative data that all states routinely collect to operate their unemployment insurance systems. Quarterly data covering employment and earnings are now routinely collected from employers. Moreover, state unemployment insurance information is objective, not subject to student recall, and can be used to measure both short- and long-term labor market outcomes. By following students over a longer period of time, the full labor market effects of vocational education programs can be measured.

The feasibility of using state unemployment insurance data to assess students' employment and earnings has been demonstrated in several states. A project undertaken in Arizona in 1985 used unemployment insurance records for students attending both public and proprietary postsecondary institutions to determine job placement rates and earnings.[50] An ongoing effort in Florida augments unemployment insurance data with information on military and postsecondary enrollment. Florida also conducts supplemental employer surveys to obtain occupational classification data from which it determines whether job placements are training related. Vocational programs in several other states have begun to explore the use of unemployment insurance records as a way to measure the labor market performance of students. Parallel efforts are under way in various states by those administering the JTPA program.[51]

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[49] Existing national longitudinal data containing employment records are inadequate for estimating labor market outcomes at any subnational level. Performance-based policy requires outcomes measured at the program or institutional level.

[50] This project is discussed extensively in Hoachlander, et al., *Performance-Based Policy Options*.

State unemployment insurance data do, however, have several limitations. Some categories of workers are not covered, out of state workers cannot be traced using a single state's data, only total earnings per quarter and not wage rates are reported, and worker occupations are not identified. Many of these limitations can be rectified by linking unemployment insurance data with additional data sets, or by adding limited and low-cost follow-up employer surveys to determine a worker's hourly wages.

One difficulty with measuring labor market outcomes is that differences in institutional performance may reflect not only differences in program quality but also differences in the types of students served. A program serving many academically disadvantaged students is unlikely to have completion or placement rates as high as a program that serves better prepared students. Differences in student performance may also reflect differences in local or regional labor market conditions. Adjusting for differences in student characteristics and differences in labor market conditions is difficult but not impossible. The Department of Labor has addressed the same problems under JTPA by formulating statistically-based adjustment models that states may use, or further modify, to weight the performance standards imposed on service delivery areas. These models take into account multiple client characteristics and local economic factors such as average wages, poverty levels, and employment rates. Similar models could be used to adjust observed labor market outcomes for different categories of vocational education students.[52]

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[51] For a thorough review of the uses and limits of unemployment insurance wage records, see David Stevens, *Using State Unemployment Insurance Wage-Records to Evaluate the Subsequent Labor Market Experiences of Vocational Education Program Leavers*, NAVE Contractor Report, January 1989.

Learning Outcomes

Learning outcomes include the rates at which students obtain state certification, demonstrate minimum occupational competency or "employability" in their fields, student scores on tests of occupationally specific knowledge and skills as well as their performance on tests of related basic skills, attitudes, and generalized employability.

Measuring learning outcomes is far more complex than measuring labor market outcomes, but methods of testing both general and occupationally specific knowledge and skills or competencies are available. Competency tests have been created in conjunction with introducing competency-based curricula in vocational education. Oklahoma, Vermont, Minnesota, Colorado, and Pennsylvania are implementing competency-based vocational curriculum and developing tests that measure the skills and knowledge that students who complete a program of vocational study should possess. Tests covering a wide variety of occupational fields have been developed by private organizations and are currently used by some postsecondary institutions.[53] In Tennessee, criteria for obtaining 5 percent greater state education funding include the performance of students on tests in their major fields and, as a measure of general educational competence, gains in student test scores from college entry to exit using the ACT entrance examination. According to a report from the Office of Technology Assessment, "...13 states are engaged in testing the occupational competencies of vocational and technical students, and seven states are in the process of developing competency tests for vocational students."[54]

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[52] For a discussion of JTPA adjustment models, see National Commission for Employment Policy, *JTPA Performance Standards: Effects on Clients, Services and Costs*, prepared by SRI International, September 1988.

[53] The National Occupational Competency Testing Institute is one such organization. They report testing 9,000 secondary and postsecondary students annually in approximately 60 different fields.

Some experience in using competency measures to assess program performance has also been acquired under JTPA in connection with that program's "positive termination" and "employability enhancement" standards for judging youth training activities. JTPA has placed more emphasis on general "prevocational" competencies than on detailed occupationally specific measures.

The experiences in JTPA and Tennessee indicate that it is possible to tie performance funding to measures of occupational competency and knowledge, but that the process of developing such measures can be time consuming. It will take considerable time to make measures of vocational competency operational in all major fields and in all states. Measures of basic skills and general literacy are already widely used, however, at a large number of community and technical colleges.[55]

Like labor market outcomes, measures of learning outcomes must be adjusted for differences in student characteristics before they become valid measures on which to compare institutional performance. There are two ways in which this may be done. One is to focus on the average learning gains (differences between pre- and post-test scores) for students, rather than on gross levels of knowledge and skills. In Tennessee's performance-based funding system, this "value added" is computed by comparing changes between student entry and exit on the ACT test. The other method is to develop statistical adjustment models that compare observed with expected test score results for different groups of students.

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[54] Office of Technology Assessment, Congress of the United States, *Performance Standards for Secondary School Vocational Education*, April 1989, p. 54.

[55] One observer claims that "entry-level testing [in math and reading] in [community] colleges is the norm today." Exit testing, however, is far less common. Roueche, Baker, and Roueche, *Open Door or Revolving Door*.

Educational Attainment Outcomes

This category includes program completion rates, continuation rates, course-taking in a sequence, course-taking above the introductory level, or (to encourage greater secondary/postsecondary "articulation") course-taking in a "tech-prep" or similar type of program. Continuation and completion rates can be determined at little cost by examining existing student records, which are increasingly automated at postsecondary institutions. If adjusted for student characteristics and length of program, these data can be used to compare completion rates among different institutions. Such adjustments are important, for completion rates at two-year programs should not be compared directly with those at institutions where programs are six months or one year in length. For equity purposes, measures of continuation, completion, and advanced coursetaking can be adjusted to accommodate differences among students of different races, sexes, and economic backgrounds.

Although the number of certificates and degrees earned is a common measure of educational attainment, our findings suggest its limitations as a measure of institutional performance. At community colleges, about 80 percent of students who enter do not earn these credentials. These students may engage in legitimate and valuable patterns of course-taking without earning a degree--although obviously many students do not. Distinctions between students who do not complete would be ignored if a state used degree completion as the sole measure of educational attainment.

For this reason it is important to distinguish among different groups of students and to use measures of educational attainment that are appropriate for each. For students who indicate that they expect to earn a degree or certificate, this standard measure of educational attainment seems most appropriate. For other students, however, alternative measures are called for. Because our research strongly indicates that additional credits earned in one's vocational major increase the likelihood of finding a job in that field, credits in a major field might serve as an alternative measure of educational attainment.

Finally, there is the question of who is a student for the purpose of measuring attainment. Many students are enrolled very briefly, simply taking one or two courses and leaving school. It makes little sense to hold institutions accountable for the educational attainment or labor market performance of such students. Thus, states should set thresholds (e.g., completion of *x* number of credits) that exclude those students whose engagement in postsecondary vocational education is extremely limited.

Postsecondary vocational education is a complex undertaking with multiple goals. No single measure is likely to be an adequate indicator of program performance.[56] Moreover, use of an individual measure could result in perverse effects, as schools attempt to maximize their performance ratings. Measures of occupational competency could encourage narrow "teaching to the test," job placement measures could promote the substitution of job search assistance or placement in low-quality jobs for more fundamental occupational training, and degree completion measures could result in a dilution of graduation standards.

If schools can be rewarded for doing well in one area (such as placement), but can ignore their responsibilities in other areas (such as student learning), performance funding may create undesirable incentives. Therefore, federal policy should require the adoption of multiple definitions of performance. Although states should have considerable discretion to define performance criteria and to select appropriate measures, their formulas should encourage institutions to perform well on several criteria relevant to vocational education. States should be required to develop measures for all three types of outcomes (labor market, learning, and educational attainments) and to design performance-based funding formulas so that no single indicator category counts for more than 50 percent of the total performance rating. It may also be desirable to incorporate explicit penalties in the funding formula for institutions whose performance is one-dimensional.

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[56] This is the conclusion in a report by the Office of Technology Assessment, *Performance Standards for Secondary School Vocational Education.*

Issues of Fairness

Proposing performance incentive systems always leads to concerns about the potential for "creaming," that is, recruiting only those students with the greatest likelihood of success. Creaming has been a matter of concern in the JTPA program.[57] There are two reasons why creaming is unlikely to cause serious problems in implementing performance-based funding in postsecondary vocational education. First, community colleges, technical colleges, and vocational technical schools generally do not have waiting lists of students. They take all students who wish to enroll. Second, even with performance-based funding, 95 percent of postsecondary vocational funds are likely to remain based on enrollment criteria, thereby providing strong disincentives to cream.[58] As one local administrator said in describing Tennessee's system of higher education performance-based funding: "When 95 percent of my money is still driven by FTE and only 5 percent by performance, why would I give up $95 to make $5? I will still take any student who wants to enroll."[59] In contrast, the dual system of performance incentives and performance contracts used in JTPA has resulted in the award of considerably more total resources on the basis of performance than is likely to be the case in vocational education.

Although selective admissions may not be an issue, the fairness of any performance-based system requires that performance ratings not penalize those institutions that enroll at-risk populations. Indeed, a major purpose of the Perkins Act is to give special help to those groups and, under a performance-based system, institutions that serve special populations effectively should receive special rewards. To ensure that this occurs, federal policy should require that state systems (1) adjust for nonperformance factors (chiefly, the characteristics of students served and labor market conditions); (2) reward both program improvement and "value added;" and (3) provide substantial additional weight in funding formulas for performance of students in special population categories. Each of these topics is discussed in this section.

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[57] A recent study found that specific state performance standards policies can affect the types of clients served in JTPA programs. Specifically, an emphasis on exceeding specified performance standards, coupled with the cost of providing services, tends to reduce enrollments among hard-to-serve groups such as welfare recipients and dropouts. In contrast, other policies, such as special incentives for serving specific client groups and the use of adjustment models, encourage service for at-risk groups. See National Commission for Employment Policy, *JTPA Performance Standards*.

[58] NAVE estimates that federal vocational education funds account for only 5.7 percent of total revenues for vocational programs at community colleges, although probably more at public technical colleges.

[59] Hoachlander et al., *Performance-Based Policy Options*, p. 73.

To ensure that the performance of institutions is compared fairly, states should be required to adjust for factors that affect outcomes but are outside the control of vocational educators. Two of the most important of these factors are local labor market conditions and student background characteristics. In the JTPA program, adjustment models developed by the Department of Labor have resulted in increased services to various at-risk client groups. Recent findings indicate that service delivery areas (SDAs) using the Department of Labor model to adjust performance standards served 7.7 percent more welfare recipients and 3.8 percent more school dropouts than SDAs that did not use the adjustment model.[60]

It is important that incentives be designed so that all postsecondary training institutions, not simply those whose students perform best, make an effort to compete for performance-based rewards. If institutions with the highest-performing students are the only ones to receive awards, schools with low-performing students will have little incentive to improve. It is this latter group that it is most important to influence. To ensure that relatively low-achieving institutions are encouraged to improve and are rewarded, a substantial portion of the performance-based funding formula should be tied to measures of institutional improvement in placement, student earnings, completions, occupational competency, or "value added" increases in student learning from entry to exit. On these criteria, schools with low-achieving students are capable of competing equally with schools that enroll better-prepared students.

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[60] National Commission for Employment Policy, *JTPA Performance Standards*, p. 47.

State-developed performance-based funding systems should be required to provide tangible incentives to serve special populations that may be more costly to educate. Assuring that schools serve at-risk populations can be accomplished by requiring that each state's incentive funding formula provide substantial additional weight, perhaps as much as 50 percent, for students whose need is great. In JTPA, several states increased services to welfare and dropout groups by using their 6 percent incentive funds to create special rewards for SDAs serving these groups.[61]

At the postsecondary level, additional incentives should be created for four special populations: academically and economically disadvantaged persons, handicapped persons, older students returning to the labor market after a long absence, and women and men in nontraditional programs. Each state would develop a consistent definition of students in each of the weighted categories. For example, *academically disadvantaged* students might be defined as those who enter postsecondary education with reading scores below the 9th-grade level. *Economically disadvantaged* students could be defined as persons eligible to receive Pell Grants, food stamps or other welfare benefits, or persons receiving unemployment insurance for a period of three months prior to enrollment. Persons returning to the labor market might be those above the age of 24 who have neither worked for salary or attended postsecondary education during the previous five years.

Issues of Design and Administration of Performance Funding

State Administration

The Perkins Act requires states to designate a single agency to oversee the administration of federal funds for both secondary and postsecondary vocational education. In a handful of states is the designated board responsible for overseeing state and local postsecondary vocational education. In most states the "sole state agency" is responsible only for secondary vocational education and, perhaps, adult or vocational-technical schools.

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[61] Ibid., p. 48.

Agencies directly responsible for administering the postsecondary vocational education system often play a limited role in overseeing the use of Perkins Act funds. Sometimes major providers of postsecondary vocational training are, in effect, excluded from receiving Perkins Act funds. The success of performance-based funding requires strong state leadership at the postsecondary level, which the current Act does not always facilitate.

We recommend that the governor of each state designate a "lead" agency to develop and administer the postsecondary performance information and performance-based funding system. We prefer that the governor choose the lead postsecondary agency so as to tie decisions about resource allocation to meeting the state's job training and economic development needs. The designated agency should be required to state publicly which types of institutions (community colleges, postsecondary vocational-technical schools, technical colleges, school district adult education programs, area vocational schools, etc.) are eligible to receive federal vocational education funds. Public disclosure will make decisions to exclude certain types of institutions more difficult.

Performance incentives will be most effective when applied to a broad range of vocational training institutions. However, community colleges may differ from technical colleges and vocational-technical schools in their approach to vocational training so much (especially in requirements for academic course work) that one set of performance measures could effectively exclude one type of institution or the other from receiving federal funds.[62] Therefore, we recommend that the designated state agency should be permitted to allot separate pools of money to different types of institutions in relation to their full-time-equivalent enrollment in vocational courses that carry credit toward a degree or certificate. Vocational training institutions of a similar type would then be rated jointly on performance, and their allotted pool of resources distributed accordingly. It is preferable that states determine full-time-equivalent counts in vocational programs on the basis of credits earned in vocational subjects. The share allotted to different pools should be adjusted at least every three years to reflect changes in enrollment.

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[62] For example, a state funding formula that placed heavy emphasis on academic skills and relatively little emphasis on specific occupational competencies would implicitly favor community colleges, where 70 percent of the course work is in academic subjects. Conversely, if occupational competencies were the only learning outcomes valued, more narrowly focused vocational and technical institutions would benefit.

The same percentage of funds allotted for state administration and indicator development at the secondary level should also be available to the designated postsecondary agency. Based on the current Act, up to 20 percent of the postsecondary funds would be available to the designated postsecondary agency, with at least 13 percent for the design and implementation of the performance-based information and funding systems, and no more than 7 percent for state administration. Funds for state administration could be used to provide technical assistance to institutions that are performing poorly.

Allocation of Funds to Postsecondary Vocational Education

Under the current Act, each state establishes its own division of resources between secondary and postsecondary vocational education. The result has been wide variations among states in the share of their Perkins Act funds allocated to the postsecondary level. Eight states allocated less than 20 percent of their Perkins Act funds to postsecondary vocational education in 1986-87, and nine states allocated more than 60 percent of their funds to this level. Obviously, states that allocate a small share of their total funds to the postsecondary level cannot be expected to provide credible financial incentives geared to performance. Where postsecondary expenditures amount to less than 20 percent of the state's Basic Grant allocation, it is appropriate to require states to design and implement a system providing performance information only.

Funds Distribution

Performance-based funding can fail to motivate institutional improvement if the financial consequences of poor performance are indistinguishable from the consequences of superior performance. This situation may occur if performance standards are set so low that virtually all institutions are assured of meeting the standards, or if states simply reallocate their own funds to "reimburse" those institutions that lose federal funding. The standards problem can be addressed by requiring that the funding formulas that states develop allocate funds among institutions in proportion to their performance rating and that, at a minimum, a given percentage of eligible institutions receive no performance funding (perhaps 25 percent).[63] The substitution problem is discussed below under "How Federal Funds Are Used."

Phasing In the System

Development of a fully operational performance incentive system will take several years, and it must be periodically fine-tuned thereafter. We recommend that performance-based funding be phased-in over a four-year period. In Phase I (years 1 and 2 after reauthorization), states should be required to develop and implement a system of performance information. States should identify performance indicators, develop appropriate measures, obtain the necessary data, and at the end of this period, issue performance reports appropriate for different audiences. In most states this system should focus initially on measures of program attainment and labor market outcomes. The sources of information necessary to measure these performance outcomes are readily available in school records and in the state unemployment insurance wage records. Measures of learning outcomes, because of their complexity, will probably take longer to put in place.

In Phase II (years 3 and 4), states would develop and implement a system of performance-based funding. States would develop rules for linking the allocation of their federal vocational education funds to institutional performance on various types of student outcomes. Year 3 should be devoted to developing appropriate formulas and trial runs that forewarn institutions about how their federal funds are likely to be affected by a performance-based formula. In year 4, states should be required to allocate all their federal vocational education funds spent at the postsecondary level in accordance with a federally approved performance funding formula.

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[63] The key to determining what proportion of eligible institutions should receive a performance-based award is to maintain a large the pool of institutions competing for such funds while keeping the average award at an amount sufficient to maintain interest. Under the Perkins Act, 80 percent of the eligible postsecondary institutions receive awards; the median amount, $92,395, is substantial (see Janet P. Swartz, *State and Local Response to the Carl D. Perkins Act: Survey Analysis: Final Report*, NAVE Contractor Report (Cambridge, MA: Abt Associates, January 1989), exhibits 3.4 and 3.12).

Program Coordination

Secondary and postsecondary designated agencies should be strongly encouraged to cooperate in the development of performance measures. Designing ways to access state wage record data, to determine whether placements are training related, and to measure certain occupational competencies are most efficiently undertaken as joint secondary-postsecondary activities. Cooperation would not preclude secondary and postsecondary systems from using different measures of program performance, or placing different weights on similar measures.

Vocational education and the JTPA program share an interest in measuring the labor market performance of students who participate in postsecondry vocational programs. Should both programs increase their reliance on existing unemployment insurance wage records, a direction that appears likely, it would be both inefficient and burdensome on state officials and employers for JTPA and vocational education to proceed independently. Therefore, we recommend a strong federal mandate that JTPA and vocational education coordinate closely any efforts they undertake to use state wage records to assess the labor market performance of program participants.

How Federal Funds Are Used

Performance-based funding leaves decisions about how federal funds are to be spent to local educators. We recommend only two obvious and limited restrictions on the uses of federal funds. First, institutions that receive performance awards should be required to use federal funds for the improvement of vocational education programs. Whether they buy equipment, improve curricula, hire teachers, or give bonuses to their best teachers is their decision. Second, performance rewards should not supplant other sources of state and institutional support for vocational education. If states can decrease state support when they reward an institution with performance-based federal funds, it will effectively undo any incentive to improve.

Inclusions and Exclusions

For purposes of determining performance ratings, only students taking credit courses in programs that lead to a degree or certificate should be included. Various forms of one-time only courses, recreational course-taking, customized training, or training that is subject to performance contracts (e.g., under JTPA) should be excluded. Customized training and other contractual training arrangements already contain explicit or implicit performance incentives or rewards.

How to treat proprietary schools and other private sources of vocational training is an important issue. It is desirable to include private training institutions in the performance-based system in order to provide potential students with information on all their training alternatives.[64] Because geographic accessibility can seriously limit student choice, inclusion of proprietary schools in the performance information system may be the only way to provide students with information on all the schools in their community. Unfortunately, proprietary schools are not likely to cooperate completely in identifying their students or providing information on fields of study.

We recommend that the Higher Education Act be amended to require institutions, as a condition of eligibility for their students to receive Pell Grants and Stafford Loans, to provide to the state agency responsible for performance incentives the Social Security numbers of all students, identifying those that receive degrees and certificates. As states publish the information, consumers will be able to compare program completion rates, and the earnings of students who complete programs. We do not recommend, however, that states be required to make proprietary schools eligible for performance funding. Students attending proprietary schools already receive $2.8 billion in federal student grants and loans. Moreover, the private nature of these institutions makes them accountable implicitly to their customers for performance.

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[64] Recent Department of Education regulations to lower default rates on student loans require proprietary and vocational-technical schools to divulge completion and placement rates to new students.

Privacy

States must be required to develop systems that ensure that the privacy of individuals is not violated. States should not reveal any information about the achievement, earnings, or employment of any individual. There must be no possibility that such information would be unwittingly disclosed. One requirement should be that no state publish information on an institution or program in which there are fewer than five students. Under those circumstances, and for other valid reasons as well, it may be desirable to use a three-year rolling average of student performance to measure institutional performance.[65]

National Indicators

The primary purpose of this proposal is to develop fair and objective measures and incentives for improved program performance appropriate to each state. But comparison can also spur states that have been lax in developing a performance orientation. Unfortunately, existing national data are inappropriate for drawing valid estimates of performance by state and rarely contain the types of information needed to fully gauge vocational performance nationally. We therefore recommend that each state be required to provide its performance reports to the federal government. In turn, every two years the federal office of vocational education should submit to Congress a report on national indicators in postsecondary vocational education. We recognize that states will measure performance in different ways. Consequently, comparisons across states will be limited to those areas in which similar measures are employed. Initially, the area most suitable for comparison is labor market outcomes, where the unemployment insurance records are standardized across states and it is easy to define outcomes precisely.

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[65] Use of a three-year rolling average can smooth out large shifts in measures like employment that may reflect temporary local conditions, such as the closing or relocation of a major employer.

CHAPTER 4

FEDERAL ROLE IN VOCATIONAL EDUCATION

The federal policies proposed in the preceding chapters require a strengthened federal role in the reform of vocational education and changing certain provisions of the current legislation. These two issues are briefly discussed in this chapter.

FEDERAL LEADERSHIP IN EDUCATIONAL REFORM

The policies recommended for secondary and postsecondary vocational education would require a far greater federal leadership in vocational improvement than has been the case in the past. The federal Office of Adult and Vocational Education (referred to here as "the federal office") would need to work with the states to foster school-level improvement, better serve special populations, develop performance indicators, and bring vocational education into the broader movement for educational reform. The main functions of the federal office should be to:

- Work with top-level state leaders to broaden public support for the reform and improvement of vocational education.
- Review proposed state plans for the reform of vocational education, and provide technical assistance in the development and implementation of those plans.
- Highlight the goal of improving vocational education for special populations, and assure the fairness and reliability of indicators and other information produced by the states for accountability purposes.
- Create a National Panel on Vocational Education Indicators and, with its advice, recommend priorities for the development of technical capacity at the state and national levels, identify the best extant indicator systems, and report on the performance of vocational education.
- Provide technical assistance to the states in the design and implementation of their indicator systems and reporting capabilities.
- Work with the states to identify, demonstrate, and evaluate promising policies and programs.
- Conduct national evaluations.

Vocational Education Indicators

The federal office should take the lead in the development of indicators. To develop indicator systems would require expanding the analytic and policymaking capabilities of the national staff. In addition, a twelve-member National Panel on Vocational Education Indicators would be chartered in legislation to 1) recommend priorities on indicators to be developed by the states, 2) report every other year on the progress of the states in developing indicator systems, and 3) identify promising indicator systems for Congress and reauthorization. The Panel should be coordinated with other indicator activities of the Department of Education and state-level indicator development. In addition, the legislation should authorize a national, open, peer-reviewed grants competition to expand the base of knowledge about measuring the success of vocational education.

Evaluations

Identifying and disseminating effective practices can be an important way to magnify the impact of limited federal dollars. Through well-designed evaluations, the Local Improvement Grants and Program Demonstration Grants discussed earlier offer opportunities to identify effective practices in secondary vocational education. At the postsecondary level, rankings on performance indicators will highlight well-performing institutions. This section outlines a joint federal-state evaluation initiative to obtain systematic information about effective practices and direct this information to those in a position to improve programs. The state-federal partnership recognizes the need to balance nationally generalizable results and the active involvement of major stakeholders.

To be most effective, the evaluation initiative should include three components: descriptive evaluation, impact evaluation, and the dissemination of results. Descriptive evaluations would be undertaken to trace the process of implementation in each of the sites, examine how students are selected for programs, and determine the feasibility of and methods for measuring program impact. The impact evaluations would be rigorous and systematic, measuring how changes in program components affect student learning, program completion, and subsequent employment. Once identified, effective approaches would be disseminated to educators for use in shaping future vocational education programs.

The evaluation initiative would focus on the main areas of vocational reform outlined earlier: 1) upgrading the skill content of vocational courses; 2) integrating academic and vocational curricula; 3) accelerating the education of at-risk students; 4) improving job placement assistance to vocational students; 5) making secondary and postsecondary training more complementary; and 6) at the postsecondary level, increasing rates of program completion. States would nominate sites for evaluation in each reform area. The federal office would select sites in a manner that allowed for as many as 25 sites in some reform areas. Sites would be selected to reflect a wide range of regions, school sizes, labor markets, and student characteristics.

The evaluations would employ experimental and quasi-experimental designs as appropriate. Sites might be expected to accept common measures of student learning or vocational outcomes, adjustments in program design in order to assure comparability across sites, or state or federal rules on student selection in order to ensure the objectivity of the data and scientific validity of the results. Any additional costs generated by such requirements would be borne by the federal office. Responsibility for conducting the evaluations would also rest with the federal office. Third party contractors would be selected for the design, data collection, and data analysis phases of the evaluations.

The federal office would appoint an advisory panel to ensure that the evaluations meet the highest technical standards and are useful to vocational educators. The panel would consist of experts in program evaluation, vocational education policy, and vocational program administration. The panel would review all major evaluation plans and reports, and advise the federal office on their scientific and educational merits.

National Policy Alternatives

The impact of the major changes in federal policy proposed in this report, including state performance indicators and performance-based funding, will also need to be evaluated. The evaluation of these changes should be undertaken in at least 10 states, and a report prepared for Congress prior to the next federal reauthorization.

Dissemination

To spur innovation and widespread interest in the results of the evaluations, the federal office should undertake several dissemination activities. First, all evaluation reports should be publicly released and distributed. Second, based on evidence from evaluations, the federal office should develop concise manuals and reports that describe programs that work. These should be intended for a broad audience including parents, teachers, and school board members. Finally, the federal office should sponsor seminars, conferences, and panel discussions among leading vocational educators to highlight and debate results.

CHANGES IN FEDERAL POLICY IMPLIED BY THE PLAN

A number of important changes in federal policy are implied by the secondary and postsecondary plans.

Eliminating the Set-aside and the Intrastate Formula

The proposed policy would mean eliminating the current special population set-asides, as well as the intrastate formula, the excess cost and matching provisions, and the service mandates.

The rationale for changing the set-asides and the intrastate formula into a single, targeted program of competitively awarded grants to schools is based on NAVE findings that:

- The small size of awards and regulatory processes required to implement the supplementary services, excess-cost, and matching provisions of the set-asides frequently result in the federal funds being used by local recipients for services that are marginal to vocational instruction.

- State practices of creating separate priorities and competitions within the set-asides and imposing additional rules beyond federal criteria further fragment the funds.

- The lack of an effective nonsupplanting requirement and the small size of grants have made the documentation of compliance with the set-asides into a bookkeeping exercise in which the federal funds are attributed to ancillary services or high cost activities that would have been supported anyway.

- Implicit in the set-aside notion and the service mandates of the Perkins Act is a belief that there are well-known ways of effectively using the federal resources. In the cases of disadvantaged students and sex equity, in particular, there is little literature on effective practices in vocational education.

- The intrastate formula has failed to increase the resources flowing to districts with the highest poverty rates--in part because definitions are loose (such as academically and economically disadvantaged students) and in part because the formula accounts for only a third of the Basic Grant funds. At the postsecondary level, the implementation of the provision has been uneven at best, since there are no systematic ways of counting eligible students.

The proposed legislative strategy targets federal resources to schools with high rates of enrollment by poor students while implementing performance-based accountability and vocational reform plans at the state level. This strategy is intended to provide a better means of achieving the same basic goals as the Perkins Act: improving the quality of programs and increasing the access of special populations to high-quality programs. The performance indicators to be developed by the states are intended to enable federal policy to shift toward performance-based accountability, provided that this approach can be demonstrated to work. Performance-based accountability has some major advantages over input-based accountability (that is, focusing primarily on expenditures of funds and services offered). Holding institutions accountable for results while giving them flexibility in using resources should produce more improvement than merely placing restrictions on the conditions under which funds can be spent. Making public the results of vocational education for students should have healthy effects. For example, indicator systems would show, at least at the district level, the job placement and course utilization rates of women who enroll in nontraditional programs. Under the vocational reform and performance indicators approach, it would not be enough to spend resources on assessments of abilities or recruitment efforts for these students. States and localities would have to demonstrate that they found these students jobs--ideally good jobs--that use their training. Data on performance with respect to special population groups would be available at the local level. By shifting federal concern from inputs alone to outcomes, states and localities would become accountable for results, not just for documented services or compliance with excess cost and matching requirements.

Performance-based accountability is needed, in part, because the input approach has failed to demonstrate a connection between Perkins goals, the services purchased, and results in terms of upgraded offerings, greater rates of course completion, and jobs. Using the disadvantaged set-aside as a case in point, the excess cost provision may encourage the support of services peripheral to vocational instruction. Or, eligible recipients may identify high-cost existing services and attribute a portion of the costs to the Perkins Act. In both of these outcomes, the set-aside and its fiscal requirements add little to the quantity or quality of vocational education for disadvantaged students. The measures and indicators approach would focus public attention on how well the needs of disadvantaged students are met in *all* school districts, thus increasing the likelihood that state and local resources will be spent for federal goals. The indicator systems would also highlight successful schools and their practices, filling a critical gap in our knowledge of what works.

Eliminating Section 204(c)

For a number of reasons, the proposed policy would also eliminate the mandated services in Section 204(c) of the Perkins Act. First, NAVE found that the assessment process, while using a substantial portion of federal set-aside funds, has not led directly to upgraded access or offerings. In part, the provision does not appear to work effectively because our knowledge of effective practices is meager. In some respects the provision creates a perverse incentive to offer "support" or ancillary services to individuals rather than focusing attention on improving vocational courses or instruction. It is a model based on assistance to the handicapped, which may not be appropriate when the problem is not one of giving individuals the ability to succeed in existing programs but one of triggering institutional change. The proposed Local Demonstration Grants would be designed to improve institutions that serve disadvantaged students and to learn what approaches and services are most effective. With that information, federal and state policy could then be directed toward appropriate services.

But even more to the point, the proposed objectives for the reform of secondary and postsecondary education supersede the guidance on service priorities contained in Section 204(c). The proposed objectives are broader and more substantively directed to improving the quality of programs to which disadvantaged and handicapped students have access than are the stipulated services in Section 204(c).

Strengthening Other Provisions

Certain provisions of the law need to be strengthened. Foremost among these is the equal access provision. The legislation should incorporate new language to make it clear that this provision does not apply solely to programs receiving federal support, but to all local recipients of federal funds, whether or not the programs receive federal support. If the notification of available vocational offerings provisions is continued [Section 204(a)], it might be useful to further prescribe that parents be notified simultaneously of their children's right of equal access to all vocational offerings and services. Finally, the nonsupplanting provision in the legislation should be revised and implemented as discussed in Chapter 2.